SCIENCE GOSSIP.


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HARDWICKE'S

SCIENCE-GOSSIP:

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HARDWICKE'S

Science-Gossip:

AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

EDITED BY

J. E. TAYLOR, Ph.D., F.L.S., F.G.S., F.R.G.S.I., &c.

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PREFACE.

THE necessity for writing a few prefatory remarks to another volume of SCIENCE-GOSSIP reminds one of the swift march of Time, as well as of the slow and certain tread of modern Science. The past twelve months have witnessed additions in every department of natural science, as lastingly organic as the layer of new wood which, in trees, has encircled the concentric rings of bygone years. It is not enough for a man now to profess himself a *naturalist*—the term is almost too incomprehensively vague,—and it is necessary for a student to devote himself, if not entirely, yet specially to one or two particular branches.

For students and readers of every class we have endeavoured to cater, we hope with some success. In view of the large progress which Science is making, and of the greater number of students its fascinating discoveries are attracting, we felt inclined to increase the number of pages of our well-known Journal. Our intention was thus to prepare a more abundant and varied intellectual supply. But this could not have been done without raising the price to sixpence, and we felt that one of the great purposes of SCIENCE-GOSSIP was to address the masses, to whom increase of price might mean a decreased ability to "take in" the Magazine.

We determined to take our subscribers into consultation in this important matter, and therefore requested opinion. It is with pleasure, as well as with some regret, that we announce the heartiness of the response—pleasure at the kindly, often *personal*, interest taken in SCIENCE-GOSSIP; and regret, because we felt it best, in the interest of the work our Magazine is appointed to do, ultimately not to accept it.

Hundreds of letters reached us from all parts — Australia, India, Canada, and the United States, as well as from every town and city in Great Britain, encouraging us to enlarge "GOSSIP"! Never before did the Editorial Chair feel so pleasant! Here and there came a letter pointing out difficulties which we confess we had not at first considered.

Finally, whilst personally thanking every one of our well-wishers for their hearty good wishes, we concluded that, *for the present* at least, SCIENCE-GOSSIP should not alter either its price or its form. We determined that the only alteration should be in the direction of *its improvement*—in first-class articles from well-known pens, and in a more earnest endeavour to keep popularly abreast with the progress of natural science. Our great desire is that the important discoveries and conclusions of Science shall percolate down to the densest strata of our population. The circulation was never before so great as it is at present; but our ability to improve SCIENCE-GOSSIP in every respect would be increased if that circulation were doubled. This could be effected, in the easiest manner, by every one of our old subscribers securing a new one for the ensuing year.

We are pleased to know that in our desire to increase the usefulness and efficiency of our unpretending Magazine, we have the hearty co-operation of its new Publisher, whose great wish is to improve it in every respect, whilst supporting its traditional style of treatment. The first proof of this cordial assistance on his part is the publication of a *Classified Index* of all the Volumes of SCIENCE-GOSSIP, including the present, twelve in number. Under the headings of Zoology, Botany, Geology, Microscopy, &c., the reader will there find the entire contents of the Twelve Volumes alphabetically arranged. We hope that this will prove a valuable synopsis of recent natural history knowledge. It is intended to publish the INDEX concurrently with the present number, or very shortly afterwards.

Nothing remains for us now, except to extend the Editorial greeting to each and all of our large circle of friends, and to thank them cordially for active as well as passive sympathy and support received by us during another year of our Editorial life.

LIST OF ILLUSTRATIONS.

THE STUDY OF GRASSES.

No. I.

IT is surprising that so little appears to be known amongst botanists and others regarding our British grasses. Even those who profess to be botanically inclined shun this part of the science as a kind of bugbear. It is quite true they recognize a grass when it is seen, by certain outward signs; beyond this they decline to proceed any further. I confess for my part, if any portion of my herbarium interests me more than another, it is the dried grasses, of which I now possess many hundreds of both species and varieties. Again, why so many persons take a deep interest in pteridology and neglect all other departments of botany is to me a mystery. It is for the purpose of inducing some of my young friends, for their own sake, to begin to look more closely into our grasses, that I write this short paper. If I can persuade only one student to commence, I shall not have laboured in vain; for a little thought will convince every unprejudiced person that the supposed difficulty is a mere myth.

Most country people will point out *one* or all of the following British grasses, if the common English name only is used. Common ray, or as usually pronounced, rye-grass (*Lolium perenne*); silvery oat-grass (*Arrhenatherum*); and common meadow soft grass (*Holcus lanatus*).

Suppose you have the last-named grass on your study table, and are wishful to learn something about it. We recommend these grasses, because the floral parts, being tolerably large, can be studied without a microscope. This grass is exceedingly common, and often gives a peculiar purplish tint to meadows of ripe hay-grass. It has a soft velvety feel when handled. This, together with the pinky-red colour of the flowers, is an unmistakable character; so that you will readily distinguish it from all other species. Turning now to some descriptive botanical work, supposing you have one at hand, you will probably read something like the following respecting this large and important natural family, called by botanists "*Gramina*," or "Grass Family":—

"*Florets* mostly perfect, one, two, or more *imbricated* on a common *axis*, or *rachis*, situated within an involucre, consisting of one or two *glumes*. *Perianth* glumaceous, the fertile florets generally consisting of two dissimilar *glumellas*," &c.

This seems enough to terrify any one; you lay the book down in despair, and declare you will never again study the grasses. Let us calmly look it over and see what we can do. *Glumes* and *glumellas* certainly look more formidable in print than they are in reality. On this occasion we wish you to dissect the specimen without the aid of any illustrations, but merely by the simple description here given. Next month we will again take up the subject, and, by means of two or three small engravings, try to throw a charm around the subject, and fill it with interest to all our readers.

Now take from the flowering head, which is named a *panicle*, a flower; by separating them with a pin you will easily perceive what you suppose bears a close resemblance to a perfect flower, containing stamens and pistil. A caution is here needed. Some parts of the panicle may not be mature, *i.e.*, the flowers are undeveloped. Search on; you will soon find a perfect "*floret*."

These florets are often named "*spikelets*."

We presume you are tolerably conversant with the formation of a flower, such as the buttercup or wild rose. If so, you are aware that on the outside, supporting all the other parts, and intended, especially when in bud, to cover up and protect the more tender organs, is the "*calyx*," or cup, each division of which is named "*sepal*." The second ring of floral organs, in the rose, for example, is

called "*corolla*"; this is the gaily-coloured and attractive portion of the flower; its divisions are named "*petals*." In our next paper, if you do not know these organs, they will be explained in a homely, simple manner, so that you cannot afterwards mistake them.

But in the "*spikelet*" of the meadow soft grass, now under examination, these organs, although present, are altered so much in appearance that you could not recognize them as the calyx and corolla, or what you would call by that name in flowering plants. Thus, on the outside, at the base, are two small, purplish, boat-shaped, bract-like organs, with three veins running up each; these correspond to the "*calyx*," but are called "*glumes*"; then next to these are the two "*glumellas*," or "*corolla*." The latter are green, therefore easily recognized; they are also much smaller in size than the glumes, which (glumes) in this grass are almost transparent as a piece of glass, so that the glumellas can be seen through them. The "*perianth*," mentioned above, is applied to both the calyx and corolla, when it is difficult to distinguish one from the other; thus the glumes and glumellas are the protective organs of the flowers in grasses, or the perianth. Another name applied to the glumella in some botanical works is the "*palea*."

In some of the spikelets you will detect both stamens and pistil; in others only the stamens, or pistil, are present. The stigma, or the upper part of the pistil, is a very pretty, feathery appendage; also the anthers, or the head of the stamens, containing the pollen, or fertilizing dust, are very elegant, suspended on a most delicate stalk; but these parts shall be more fully explained shortly.

I hope in this short lesson we understand some little about the formation of the grass flower,—sufficient to stimulate us to know more, and enough to persuade us that there no real difficulties whatever to those who are determined to be masters of the subject. R.

PAPUANS IN AMERICA.

HAVING long taken an interest in American archæology, allow me to call the attention of your readers to traces which I think I have discovered of the existence of certain tribes of Papuans in America. This is in itself by no means improbable, since there is every reason to believe that both the civilized races and the Californian Indians (at least) were of Polynesian origin, and reached America through the Polynesian archipelagos. We know from Williams, Wallace, Pickering, Earl, &c., that the Papuans were the aborigines of a large portion of Western Polynesia, and possessed (at least in Fiji) admirable sea-going canoes; I am, therefore, justified in suggesting that partics of them extend further to the east, and reached America in early ages through Eastern Polynesia. Dr. Pickering thinks that stories of "black aborigines" in America may be referred to Malay Polynesians, but Papuans would answer much more closely to the description. Helps tells us* that the Spaniards, when they first discovered Panama under Vasco Nuñez, found a race of black men, supposed to be shipwrecked negroes, in Darien, living distinct from the other races. The Spaniards appear to have allied themselves with them in their contests with the Indians of the country. Some of them built homes in trees as the Papuans and Cambodians do.† In Brazil we find a native tribe of Indians—the Cafutos—still existing, with negroid features and wiry Papuan hair. These people are ignorantly considered to be a cross between negroes and Indians,‡ but are, I believe, pure Papuans. A singular resemblance between the customs of Fiji and the South American Indians is observable in the method of manufacturing an intoxicating drink by *chewing*. This drink is called "kava" in Polynesia. The Yagnas of Brazil have an identical method, thus described by a recent missionary: §—"The process of manufacturing *masáta* (a drink commonly patronized by the Indians in Ecuador, Nueva Granada, and Venezuela) is certainly not calculated to enhance one's relish for it. A quantity of yuca is scraped and thrown into a number of jars, each capable of holding from ten to fifteen gallons, and then a bevy of females—in point of fact, all hands—sit upon the ground and masticate the root, throwing each mouthful into the jars. In three days the milky liquor ferments, has an agreeable acid taste, and, if imbibed in excess, intoxicates." This method exactly agrees with the Fijian one. It seems hardly probable that this singular style of brewing was invented in two *distinct* localities—*i.e.* in Polynesia and South America.

It seems to me evident, from the descriptions given of the black and ferocious Charruas or Charruan Indians of Paraguay, whose hand was against every other Indian tribe, and who were finally exterminated by the President of Uruguay in 1831, that they were also evincing the peculiar characteristic of the Papuan race—which has proved fatal to them in their contest with the Malays—*i.e.*, that

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* See his "History of Spanish Conquest in America," vol. i. p. 360.

† Ibid., vol. i. p. 421; also Earl's "Papuans," pp. 53, 115; and Mouhot's "Cambodia," p. 238.

‡ See "The Golden Americas," p. 180. Ward & Lock, London.

§ See Mr. Clough's "Journal of Travels on the Amazon," in *The South American Missionary Magazine*, June, 1875, p. 199.

insubordinate and fierce personal independence which prevents them from obeying a chief or allying themselves with others for self-defence.*

If the attention of ethnologists and archæologists were once drawn to the importance of detecting Papuan tribes in aboriginal America, great light might, I think, be thrown upon the origin of the American races and of the singular civilization which once flourished in the New World.

The Papuan has, as Wallace tells us repeatedly, a higher intellectual capacity and "feeling for art" than the Malay. †

Pickering calls the Fijians "a far more ingenious people than the (Malay) Polynesians." ‡

May it not be that we owe some of the great monuments of America to an admixture of Papuan blood? Herrera (quoted by Stephens, p. 533) says that the Indians of Yucatan (Mayas?) wore their hair in tresses of spiral curls at the time of the conquest, as the Papuans still do, and some of the figures sculptured at Palenque present the same peculiarity.

It is an interesting fact that the aboriginal negroid or Papuan races still inhabit the interior of Indo-China) to the languages of which the dialects of the Central American races have recently been discovered by Mr. Hyde Clarke to be closely allied, § and that Buddha is commonly depicted in China and India with negroid features—his mother Maia (or Maya) being of Papuan race, *i.e.* a Moy. ||

Civilization may have reached a far higher development amongst the Papuan races than we are aware of, and we may owe more to this despised race than we generally suppose.

FRANCIS A. ALLEN.

THE MICROSCOPE, AND MICROSCOPIC WORK.

No. 1.—BY F. KITTON.

IT is an old saying, that a bad workman finds fault with his tools; and, no doubt, the converse holds good, that good work will be done by a skilled workman even with bad tools,—and this is very conspicuously the case if we look at the work done by such men as Hooke, Leeuwenhoek, Swammerdam, Baker, and others, with the instruments at their command. It must, however, be understood that these men were not microscopists, they did not look upon the microscope as a superior kind of peep-show, for which pretty slides were to be prepared, like slides for a magic-lantern. The proper use of a microscope is to enable us to examine and study objects too minute to be visible to the unassisted eye, and not to look at arranged diatoms, butterfly scales, and crickets' gizzards. Our opinion would be small indeed of an entomologist or conchologist who arranged his specimens in groups of flowers or geometrical patterns, and, instead of employing a scientific arrangement, only studied how to make his cabinet look pretty. The "microscopist," however, delights in a slide of arranged diatoms, on which fresh-water and marine forms, fossil and recent, rare species from the Pacific Islands and those from the nearest wayside ditch, are arranged so as to form a star or some intricate geometric pattern. I do not object to the selection or even arrangement of diatoms when, as it frequently happens, we can only obtain them mixed with sand and other *débris;* and if few in number this method places many forms together, and enables us to detect any variations that the species may be subject to. It has also another and a greater advantage to the manipulator, who whilst picking out sees the form under various aspects. Another kind of arrangement, viz., one on which some fifty or more species from the same gathering are placed together, is also useful, as showing the number of species to be found in the same habitat; but butterfly scales arranged as flowers (with, perhaps, diatom valves for centres) cannot be of the slightest scientific value. All that can be said in their favour is, that they show considerable manipulative skill. I must also protest against the term "microscopist," or "microscopy": there is no such science. One may study the minute forms of animal or vegetable life, or may trace the minute structure of tissues of the larger forms, but these are departments of zoology, botany, and histology; or the microscope may be used for investigating the forms and optical properties of crystals, but that study is crystallography. We have clearly shown that there is no such science as microscopy (unless the collecting and looking at pretty objects can be called so). It would seem absurd to call the study of the stellar worlds telescopy, or the student a telescopist, but these terms would really not be more so than microscopy or microscopist. I would urge all those who possess a microscope to use it for the purpose of investigation (it matters but little what department they take up), and follow the example of such men as Beale, Drysdale, Dallinger, and several of the contributors to this periodical. Every one does not possess the skill of preparing slides equal to those sold by the opticians, but it does not require much skill to dissect an insect, and see the relation

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* See Latham's "Man and his Migration," p. 105; and also "The Papuans," by G. W. Earl, M.R.A.S. (Is not this a distinctively Turanian feature?)

† See Wallace's "Malay Archipelago," p. 587.

‡ See "Races of Men," pp. 152, 153; and also Earl's "Papuans," p. 68.

§ See papers read before the British Association, 1874.

|| See Earl's "Papuans," p. 159.

that various parts bear to each other. Suppose, for example, he possess a properly-prepared slide of the gizzard of the cricket or the spinnerets of a spider, it would be a matter of little difficulty to dissect a cricket or spider, and see how those organs are connected with other portions of the insect.

All of us who have exhibited our slides and instruments at what are called scientific *soirées* have been struck with the want of interest shown by the public in the objects exhibited, and by the singular comparisons made use of. I have heard a section of an injected tongue of a cat compared to a map of England, and a valve of *Heliopelta Metii* shown with black ground illumination, to the top of a thimble. This want of appreciation may be easily understood when we consider how small a portion of an object even with a low power is seen (about ¼ of an inch), and, as is often the case, the exhibitor, who has probably purchased the object, can give no information as to what is seen in the instrument.

The inventor of the microscope will probably never be discovered, and perhaps no one could ever claim that merit. The magnifying property of spheroidal transparent substances was no doubt discovered and utilized many thousands of years ago, and it has been stated that a convex lens was found in the ruins of Nineveh. It is, however, only in recent times that we have any authentic records of the microscope. Dr. Brewster, in his "Treatise on Microscopes," mentions that "Zacharias Jansen presented one to Prince Maurice, which in 1617 came into the possession of Cornelius Drebbel, of Alkmaar, who then resided in London as mathematician to James I., in which place he made microscopes, and passed them off as his own invention. These instruments were said to be 6 ft. in length, and consisted of a tube of gilt copper 1 in. in diameter, supported by thin brass pillars in the shape of dolphins on a base of ebony, which was adapted to hold the object to be examined. Nothing, however, is known of their internal construction; they were probably nothing more than telescopes converted into compound microscopes." Viviani, the author of a Life of Galileo, says that this great man was led to the discovery of the microscope from that of the telescope, and that in 1612 he sent one to Sigismund, king of Poland. The invention of the compound microscope is, however, usually attributed to Zacharias Jansen, or Zansz, spectacle-maker, of Middelburg, in Holland, about the year 1590.

About the middle of the seventeenth century we come to a period when the learned men of the time turned their attention to the construction and improvement of the microscope, and the early volumes of the "Transactions of the Royal Society" frequently contain papers on the instrument and the discoveries made therewith.

In 1673 the great Leeuwenhoek contributes his first papers to the "Philosophical Transactions" but before giving a short *résumé* of his labours it may perhaps be desirable to form some idea of the kind of instrument he used. Henry Baker, F.R.S., in his work on the "Microscope," edit. 1753, gives figures and a description of one of Leeuwenhoek's microscopes. At page 434 he says:—"Though Mr. Leeuwenhoek's Microscopes are much talked of very few People are acquainted with their Structure and Apparatus, no Figure of them that I remember having ever been made publick: 'tis therefore hoped the Curious will be pleased to see a Drawing of them taken with great Exactness from those in the Repository of the *Royal Society*, which are all alike in Form and differ very little in Size from this Drawing or from one another."*

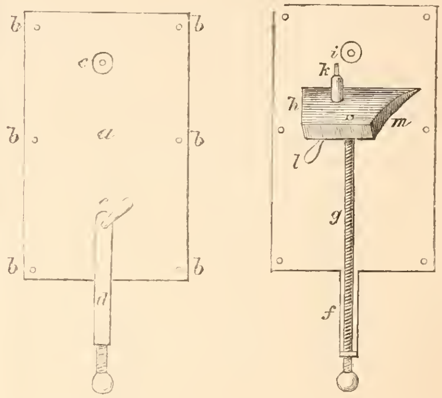

Fig. 1. Fig. 2.

Representations of one of Leeuwenhoek's Microscopes, from "Baker on the Microscope."

"The flat Part, *a*, fig. 1, is composed of two thin Silver Plates, fastened together by little Rivets, *b*, *b*, *b*, *b*, *b*, *b*. Between these Plates a very small double convex Glass is let into a Socket, and a Hole is drilled in each Plate for the Eye to look through at *c*. A Limb of Silver, *d*, is fastened to the Plate on this side by a screw, *e*, which goes through them both. Another Part of this Limb, joined to it at right Angles, passes under the Plates, and comes out on the other side at *f*, fig. 2; through this runs directly upwards a long, fine-threaded screw, *g*, which turns in and raises or lowers the Stage, *h*, whereon a coarse, rugged Pin, *i*, for the Object to be fastened to, is turned about by a little Handle, *k*; and this Stage, with the Pin upon it, is removed farther from the magnifying

* Leeuwenhoek bequeathed to the Royal Society a small cabinet containing twenty-six microscopes and objects, of which a description was given by Martin Folkes, Esq., in No. 380 of the "Philosophical Transactions."

Lens, or admitted nearer to it, by a little Screw, *l*, that, passing through the Stage horizontally, and bearing against the Back of the Instrument, thrusts it farther off when there is occasion. The End of the long Screw, *g*, comes through the Stage at *m*, where it turns round, but acts not there as a Screw, having no Threads that reach so high.

"These microscopes are plain and simple in their Contrivance. All the Parts are Silver fashioned by Mr. Leeuwenhoek's own Hand; and the Glasses, which are excellent, were ground and set by himself. He glued one, or at most two, Objects on the point of the Pin belonging to each microscope, and carefully preserved them there; so that each Instrument, being devoted to one or two Objects only, could be applied to nothing else. This Method induced him to make a Microscope with a Glass adapted to almost every Object, till he had got some hundreds of them, as he says himself in the 2nd vol. of his Works, page 230, *Mihi quidem sunt centum centumque Microscopia*, &c. All this Trouble and Expence is now saved by a Set of Glasses, to be shifted with great Ease, as the Subject to be examined may require.

"The magnifying Powers of these Glasses come short of some now made, but are fully sufficient for most Purposes. Of the 26 Microscopes I examined, one magnifies the Diameter of an Object 160; one, 133; one, 114; three, 100; three, 89; eight, 80; two, 72; three, 66; two, 57; one, 53; and one, 40 times."

These instruments, we need scarcely observe, were much inferior to the cheapest English or continental microscopes of the present day, and it is a matter of surprise that so much really good work could be accomplished by tools of such inferior quality. Of course a very large portion of the microscopic Fauna and Flora with which we are now acquainted was totally unknown to the microscopic workers of that period; Desmids and Diatoms could not be, or at least were not, detected by such aids as those just described.

We now proceed to give a short *résumé* of the work accomplished by the "*Great Leeuwenhoek*."

In the Preface to his "Select Works, containing his Microscopical Discoveries," he remarks, that "I have heard that many persons dispute the truth of what I advance in my writings, saying that my narrations concerning animalcules, or minute living creatures, are merely my own inventions. And it seems some persons in France have even ventured to assert that those are not in truth living creatures which I describe as discoverable to our sight, and alledge that, after water has been boiled, those particles in it which I pronounce to be animalcules will be still observed to move. For my own part, I will not scruple to assert that I can place before my eye the smallest species of those animalcules concerning which I now write, and can as plainly see them endued with life as with the naked eye we behold small flies or gnats sporting in the open air, though these large animalcules are more than a million of degrees less than a large grain of sand. For I not only behold their motions in all directions, but I also see them turn about, remain still, and sometimes expire; and the larger kinds of them I as plainly perceive running along as we do mice with the naked eye. Nay, I see some of them open their mouths, and move the organs and parts within them; and I have discovered hairs at the mouths of some of these species, though they were some thousand degrees less than a grain of sand." *

Leeuwenhoek means that the solid contents of a grain of sand would be a thousand times greater than the animalcule, and not that the animalcule was a thousand diameters less than a grain of fine sand. This is rendered evident by his remarks a little further on: he says,—"In examining the intestines of flies and other insects by the microscope, I have discovered vessels conveying the blood and juices, the smallest ramifications or branches whereof appear to me more than 200,000 times less than a hair of my beard." Supposing the hair to be the $\frac{1}{50}$ of an inch in diameter, the highest magnifying power at his command would not have enabled him to have discerned vessels only the $\frac{1}{200000}$ part of the $\frac{1}{50}$ of an inch ($\frac{1}{1000000}$ of an inch) if diameters were meant.

His plan of obtaining the size of a minute object is worth transcribing:—"I have a plate of copper with many lines engraved on it, and divided into a number of small equal parts. I then carefully observe how many of these parts one hair taken from my beard and seen through the microscope appears to cover. Supposing that the diameter of this hair appears equal to fifty of those parts, then with the point of a needle I trace on the copper a line of the same size by the naked eye as is equal to one of the small veins or vessels in a fly† seen through the microscope, and I find nine of those small veins so traced with a needle, when placed close together, are the fiftieth part of the diameter of the hair. If, then, 450 diameters of those small veins which I most plainly see in a fly are no more than equal to the diameter of one hair taken from my beard, it follows by the rules of arithmetic‡ that one of such hairs is more than 200,000 times larger than those very small blood-vessels in a fly."

(*To be continued.*)

* The grain of sand he afterwards describes as being of the kind called glass-grinder's sand.

† Leeuwenhoek probably saw the tracheal tubes.

‡ Now, the area of circles being in proportion to the squares of their diameters, the proposition may be thus demonstrated:—

$$\begin{array}{r} 450 \\ 450 \\ \hline 22500 \\ 1800 \\ \hline 202,500 \end{array}$$

NOTES ON PLEOMORPHISM.

By P. Duffy, F.L.S., F.C.S.

In philosophical language the term *identity* indicates the sameness of a substance or thing under every possible variety of circumstances. This is the abstract definition of identity, but in nature we can no more find it realized than we can find realized the mathematical definition of a straight line. On the contrary, I am inclined to think that the more extensive our knowledge may be of the facts which nature reveals to our observation, the more embarrassed we become in forming the conception which the abstract definition of identity suggests, for experience teaches nothing more impressively than that the slightest change in the environment of any material body is accompanied by a corresponding alteration in its properties. Thus, whenever we alter the conditions of light, heat, electricity, and gravitation, by which any substance is surrounded, do we not produce some correlative change in the qualities of that substance? And is it not equally true that under any given set of circumstances almost every substance will assume the same condition that belongs to it at any other time under that same set of circumstances? If we heat a piece of platinum, for instance, and after heating allow it to cool to the temperature with which we started, we find that it resumes all its original qualities, and that, provided no chemical reaction be allowed to intervene, its bulk and its specific gravity, which is the same thing in other terms, and its relations to heat, light, and electricity will be just the same as those it possessed before we subjected it to heat. Every test of identity that we can now apply to it elicits but one uniform answer, viz., that it is the same substance; and this result is perfectly in accordance with what our ordinary conception of identity in nature leads us to expect. But we should err greatly if we were to conclude that every material substance conforms rigidly to these notions. So far is this from being the case, that there are many bodies, several solid and some liquid, which admit of a variation of properties, and present different appearances under the same conditions of temperature, light, and so forth. Most persons are acquainted with the two forms of carbonate of lime in calc spar and arragonite, which not only belong to different crystalline systems, but differ in density, and are further distinguished by the peculiar property possessed by calc spar of doubly refracting a ray of light. Now, although there is, as we see, as great a difference between calc spar and arragonite as there is between many bodies that are in no sense identical, it is a fact that we may transmute these two substances one into the other, and chemistry can point out no difference in the ponderable elements of which they consist. Thus, if we heat a crystal of arragonite in the flame of a spirit-lamp, it falls into a powder composed of calc spar: while if we add a solution of Ca.Cl. to NH_4CO_3, we obtain a granular precipitate, the particles of which have the form of calc spar or of arragonite, according as the temperature of the solution is 50° or 150° F.; and whether the crystal be one of calc spar or one of arragonite, all that chemical analysis tells us about it is, that every 100 parts of it consist of 40 of calcium, 12 of carbon, and 48 of oxygen. A substance which has thus the power of assuming different and incompatible crystalline forms is said to be dimorphous, trimorphous, or polymorphous, according as the number of forms is two, three, or many. Although these terms, derived from the Greek word *μορφή, form,* and a prefix expressing the proper numeral, are not generally understood in chemistry to denote any other than the number of crystalline forms which a solid body is capable of assuming, I think their meaning may without any impropriety be extended so that they shall be understood to refer to every condition of the same substance in the solid state, whether crystalline or destitute of crystalline character. In biological science the term *pleomorphism* is employed to denote the actual or possible occurrence of any number of forms more than one, of an individual animal or plant, or of a species of animals or plants. For convenience in grouping together phenomena that have at least this feature in common, I intend, in the remarks I have to make, to employ the term *pleomorphism* in this sense, when speaking of non-living as well as of living matter.

We have no difficulty in meeting with illustrations of the phenomenon I refer to, either in the inorganic or organic kingdom of nature. I may begin with one that is familiar to us all. I do not assume that any of us first made his examination of barley-sugar in a spirit of science, but, whether or not, he can hardly fail to have observed that the sticks of this substance, which are at first clear and glassy, become after a time white and opaque; they pass, in fact, from the glassy condition into the granular or crystalline one, the change occurring without the slightest loss or gain of weight. This change may also be reversed, the vitreous condition of the substance being restored by merely melting it by heat and allowing it to solidify. Now the difference in the physical properties of the sugar in the one condition and in the other is as great as can be discovered between many bodies that do not approach each other in composition; yet any one who investigates the subject will find that one and the same substance underlies the two different conditions.

The transition from the glassy to the granular condition may be effected quickly if, instead of keeping the sugar at the ordinary temperature of the air,

we melt it, and allow it to cool to about 100°, and then, while it is still soft and viscid, we rapidly and frequently extend and double it up. The temperature of the mass quickly rises to 140° or upwards, and after this evolution of heat the sugar is found on cooling to be in the condition, not of a glass, but of minute crystals.

Phosphorus is another substance which is susceptible of a somewhat similar change. At ordinary temperatures it is a clear, colourless body, which melts into a liquid when heated to about 113° F., and readily catches fire at comparatively low temperatures when exposed to the air. In an atmosphere of a gas with which it does not combine, it may however be heated to a temperature of 460° or higher, and then the translucent liquid phosphorus forms a red deposit, which is nothing else than another modification of phosphorus.

This allotropic phosphorns, as it is called, may also be prepared by dissolving ordinary phosphorus in bisulphide of carbon along with a small quantity of iodine, and heating the solution to 212° in a sealed tube for some time. The red phosphorus is then precipitated from the solution in proportion as it is formed.

The difference in the appearance of the two modifications of phosphorus is obvious. They are known to differ also in most of their properties; thus they are not soluble in the same *menstrua;* the liquids which will dissolve one generally failing to dissolve the other. The density of ordinary phosphorus is 1·83, while that of the red modification is 2·1; the temperatures at which they respectively ignite are also very widely separated. Notwithstanding all these and other differences betweeu them, they are mutually convertible. The red variety is prepared from ordinary phosphorus, and may be converted into the latter again by simply heating it to the temperature at which it evaporates, and condensing the vapour. Their properties are in many respects less alike than those of gold and platinum; yet we do not hesitate to pronounce the substance of both identical. What then causes the difference?

In the case of phosphorus, and several other bodies which are susceptible of similar changes, we have not far to seek for the answer. The difference in the properties of the ordinary and of the allotropic modifications of phosphorus, is due to the different quantities of heat that are present in a latent form in the one and in the other. It is not usual to speak of heat as a constituent of bodies, but there can be nothing better established than that its presence is the modifying element in these cases. I might give many proofs of this, but it may be sufficient to mention that in the preparations of red phosphorus by the action of iodine, Brodie found that on heating the mixture of ordinary phosphorus and iodine to 390°, a sharp explosion took place, with a loud report, while nearly the whole of the phosphorus used was found to have passed into the allotropic or red modification. In short, ordinary phosphorus in passing into the red condition sets free its combined heat, which then becomes sensible.

Among bodies derived from the organic world there is a group, known as the glycerine compounds, of the series of acids to which formic, acetic, and other acids of the general type $(C_nH_2)O_2$ belong. I know that several, and I believe that all, of the glycerine compounds of these acids, as met with in nature, are susceptible of different allotropic modifications, such as those we have been speaking of. Chemistry is familiar with some twenty of these acids, and upon good grounds presumes the existence of a great many more of them. In the whole domain of modern chemistry there is no group of bodies equal to these acids, and their connections, for interest and instruction. It were out of the scope of my present remarks, however, to enter upon a discussion of their chemical relations generally, but I may just mention that corresponding to each of the acids of this series there are an alcohol, an ether, an aldehyde, and other bodies, each of which bears a definite relation, as represented by its chemical constitution, to the corresponding terms (*isologues*) of all the other series. This is readily seen from the following formulæ of a few isologous terms of three of the series:—

	Acids.	Alcohols.	Ethers.
Acetic	$C_2H_4O_2$	*C_2H_6O	*C_4H_5O
Propylic....	$C_3H_6O_2$	C_3H_8O	$C_6H\ O$
Butylic	$C_4H_8O_2$	$C_4H_{10}O$	C_8H_5O
Amylic	$C_5H_{10}O_2$	$C_5H_{12}O$	$C_{10}H_{11}O$
	* * *	* * *	* * *
Cetylic	$C_{16}H_{32}O_2$	$C_{16}H_{34}O$	$C_{32}H_{33}O$
Stearic	$C_{18}H_{36}O_2$†		
	* * *		
Melissic ..	$C_{30}H_{60}O_2$	$C_{30}H_{62}O$ ‡.	

One of the most wonderful and interesting facts revealed by chemistry is that to each addition of this carbo-hydrogen (CH_2), corresponds a definite alteration of physical properties, such as specific heat and boiling-point. The more remote members of each series differ, as may be supposed, considerably from one another, yet they have all so much in common that it may be said—

Facies non omnibus una,
Nec diversa tamen; qualem decet esse sororum.

I think these few remarks upon the chemical characters and relations of the substances that I have now to speak of will not appear to be an uncalled-for digression, when it is borne in mind that it is upon their territory that the science of

* Vinous.

† The alcohol and ether of this term have not yet been actually isolated.

‡ Ether not yet isolated.

modern chemistry has advanced her frontier farthest, and effected her greatest conquests in the investigation of the constitution of matter.

As I have already indicated, the particular series of this group of substances to which I have to direct attention in connection with pleomorphism, consists of those fats—such as margarine, palmatine, and stearine—which, when decomposed by an alkali, yield an acid of the series in question, and glycerine. It is a very remarkable fact that there are many glycerine compounds of fatty acids which consist of carbon, hydrogen, and oxygen; but, so far as I know, it is only those the acid of which belongs to the particular type $(CnH_2)_n O_2$ that have the capacity of assuming different physical conditions; thus oleine, which is perhaps a constant accompaniment of stearine, palmatine, &c., in nature, and which differs in composition very little indeed from the type of these bodies, appears to be destitute of the capacity of assuming the allotropic conditions which are known to belong to those bodies. I have here specimens of these different substances—stearine, palmatine, margarine, and oleine; but it will be sufficient for our purpose to describe the phenomenon in question as manifested by stearine. Now stearine in the purest condition in which it has been prepared is at ordinary temperatures a solid substance, which, when heated to 125⅗° F. melts, and then, if kept at that or a slightly higher temperature, resolidifies; after this resolidification it melts only when the temperature is raised to 147°, and now solidifies again at a temperature slightly above this melting-point; but after this last solidification it melts only when the temperature rises to 157°. After this melting, however, it refuses to solidify at any temperature higher than the melting-point we began with—viz. 125⅗°. In other words, it has three different points of fusion: it melts at the temperature of the first,—solidifies: melts at the temperature of the second,—solidifies; melts at the temperature of the third, and then solidifies only when the temperature falls below all three points of fusion; and, after solidifying here it may be made to melt again at the first, at the second, and at the third melting-points respectively, solidifying, as before below all three; and these changes are reproducible in this order of succession to any extent without the slightest loss or gain of weight. Are we to say that these different melting-points belong to one and the same substance, or to three different substances? Undoubtedly they belong to one and the same substance, but to three different modifications of it. These modifications differ from one another, not only in melting-point, but in several other respects:—the first modification, or that which is formed when the substance solidifies at the lowest of the three melting-points, is amorphous,—it is destitute of all structure whatever; the third is crystalline in structure, and is, in fact, identical in all respects with the crystals deposited from a solution of stearine in ether: the properties of the second modification are intermediate between those of the other two. They are distinguishable, also, by their density, as may be seen by those specimens of the first modification floating, while the other two sink in water. What I have said of this phenomenon as manifested by stearine, holds good of it, with very slight modification, in the case of each of the other analogous substances, palmatine, margarine, &c.

(*To be continued.*)

ON A PARASITIC WORM INFESTING A MARINE FISH.

IN April, 1874, my friend Mr. W. R. Hughes, F.L.S., sent me a fine specimen of the smaller Wrasses, the *Crenilabrus rupestris*, or "Goldswing," which had been kept in his marine tank in company with several others. It had fed well and thrived in confinement (its food consisting of smelt and other white-fleshed fish), until about a week before it died, when it showed an inability to keep in the horizontal posture, and died apparently exhausted. I received it the next day, with a note from Mr. Hughes giving the above particulars, and asking for a post-mortem examination, which was made at once, with the following results.

External appearances.—There was a fulness about the ventral surface which made me suppose that the fish died consequent upon its inability to deposit spawn; but, as the examination showed, this idea was erroneous, as the fish was an adult male. Mr. Hughes told me the next day that he had held the same opinion whilst the fish was moribund, and had sent it to me for confirmation. An appearance of inflammation was observed extending upwards and around the anal orifice, but no other external indications of the cause of death were noticeable. The mouth, tongue, eyes, fins, and scales were healthy.

Internal appearances.—The viscera were all normal in their position, and apparently healthy. The red streak seen on external examination as extending inwards from and around the anal orifice, was evidently due to post-mortem changes. The heart and great blood-vessels, gills, œsophagus, stomach, liver, woolfian bodies, spleen, mesentery, lower alimentary canal, and air-bladder, were apparently healthy. Post-mortem staining was evident in nearly all these organs. The brain was well-developed and healthy, with but little change or staining. There was apparently nothiug to be seen by the unaided eye which would account for death. Whilst turning them over with the point of a narrow-bladed scalpel, I discovered a movement amongst the fibres of the connective tissue, which holds the organs in position. With a watchmaker's eye-lens

I discovered that what I had thought were fibres of connective tissue, were in reality small worm-like bodies, which were slowly moving about in the fluids and organs of the fish. On removing the visceral mass by dividing the œsophagus and aorta close behind the gills, and tearing it away from its attachments, I placed it under a two-inch lens, and

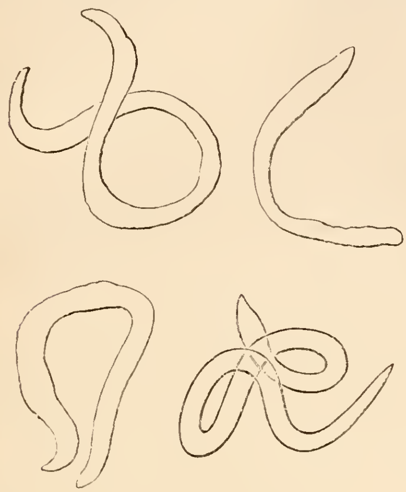

Fig. 3. Parasitic worms in fish.

found that the parasite was distributed all over and through it. Picking out several of them with a bent needle, I placed them on a glass slide, put a small quantity of the fluids of the fish with them, placed over them a cover glass, and examined them with a two-inch lens. Their general appearance resembled those of the hæmatoid class of parasitic

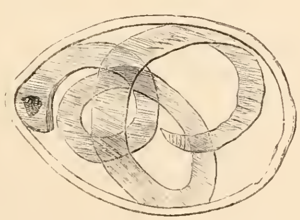

Fig. 4. Encysted parasitic worm.

worms. Fig. 3 gives a good general idea of their form. Taking the liver by itself, I pressed it well between two slides, and found several of the parasites. All the other organs were examined in the same way, and, with the exception of the air-bladder, all of them contained the worm in abundance.

Remarks.—These worms appear to be identical with the genus Prosthecosacter, as described by Professor Cobbold, and I feel inclined to believe that they agree with *Prosthecosacter minor*. I could not however make out any sexual differences, for all that were examined were apparently immature males. Yet there must have been a female hidden somewhere in the host, for I found two encysted worms on the edge of the liver, which were picked off with a bristle, only one of which was successfully mounted and drawn (see fig. 4). In the free worm there was a small opening like a mouth at the

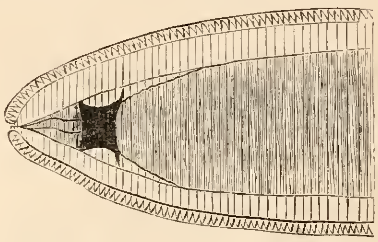

Fig. 5. Œsophagal ganglion of worm.

apex of the truncated head; an œsophagus was plainly visible, with what I took for a collar of nervous matter, embracing it externally. I presume this is the œsophageal ganglion (see fig. 5). The alimentary canal was freely suspended in a cavity,

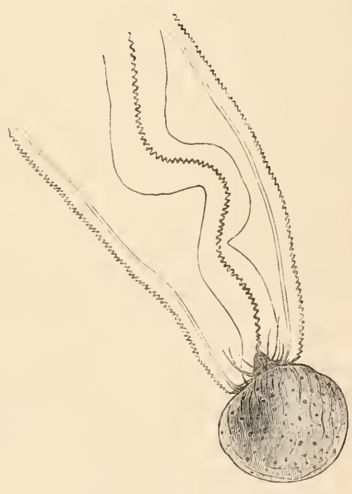

Fig. 6. Anal orifice of parasitic worm.

sometimes assuming a convoluted appearance, and had an anal orifice situated in the centre of the end of the tail, as seen in fig. 6, where the contents of the rectal end are seen to be extended. In this figure may be seen a fine corrugated line running down on the outside of the alimentary canal, which I suppose is one of the canals of the water vascular system.

This short description of a hæmatoid worm inhabiting, and no doubt killing the host, is of some little interest, because of the vast consumption of marine fish as food by the public, who as a rule are

not informed of the danger accruing to those who eat their fish half cooked. The eggs, or even encysted young, of parasitic worms are thus left undestroyed, and only waiting to be introduced into the alimentary canal of some highly organized animal as man to complete their development.

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THE CHAT AND OTHER BIRDS: A SUMMER'S STUDY.

By CHARLES C. ABBOTT, M.D.

I FIRST saw the Chat, last year, on Sunday, May 9th. From the topmost branch of a tall locust he sailed upwards and outwards for a yard or more, with fluttering wings and dangling legs, uttering a few harsh squeaks, and then alighting, warbling a sweet series of liquid notes, followed in turn by the yelping bark of a puppy, the squeak of a squirrel, or dull creaking of a rusty sign-board. Then, hopping from twig to twig searching for insects, he added his own peculiar chirp, alternated with low yet distinct notes, quite indescribable, but all hollow, ghost-like, gloomy cries. These weird, mournful groans, plaintive calls, and cries as of some poor creature in distress, would follow each other in quick succession; then, suddenly ceasing, an outburst of glorious melody would complete the strange series, and the restless bird, having regained his perch upon the topmost branch, would remain quiet for a moment, and then, with the same awkward, crooked flight, repeat the same series of strange and sweet notes, with some little variation, omitting some and adding other mimicry of uncouth sounds.

While I listened, wondering what strange sound would next greet my ears, I was surprised, even startled, by hearing them repeated, but at some distance off. Another Chat, farther down the path, is singing in the same strange way. Another it must be; for the one first heard is still in sight on the locust, flitting carelessly about, but apparently silent. Curious to hear the new-comer, I passed on, when the sounds were heard in the opposite direction. I retraced my steps, and now the strange medley came from the low bushes about me, and I looked carefully for the unseen Chat that seemed so near, when again, from the locust overhead, the series of odd sounds and sweet warblings came floating down to me.

The truth was now clear, the one bird had uttered every sound I heard, and, by his ventriloquism, had for the time completely deceived me. My study of this habit and its use now commenced, and for long weeks I watched him, to test, in every way, his ability to mislead one by the exercise of this peculiar power. On the 13th a second Chat appeared, and the two (for it was a female) quickly selected a suitable site for the purpose, and, in a tangled mass of blackberry briars at the foot of the tall locust, they soon built a commodious but roughly-constructed nest. While his mate was sitting, the male Chat seemed more animated than ever, and, jealous of every intruder, "threw his voice" in every direction other than towards the nest, if they came too near. On concealing myself, and getting very near, I found, by watching for an hour or more at a time, that when undisturbed they uttered fewer of the cries of other creatures, and seldom exercised their ventriloquial powers. Their song was varied and, at times, grand; but usually the cheerful notes were so intermingled with hollow, sepulchral tones as to render the entire utterance far from pleasing. It could never be so startled as to simply give a quick chirp of alarm and fly off. However suddenly I appeared from my concealment, there was an equally quick uttering of notes of distress such as I have described, coming, it seemed, from a point several yards distant. Vary my experiments as I would, it mattered not: the bird was thoroughly conscious of its ventriloquial power, and trusted far more to it than to flight to avoid and mislead its enemies.

How came this bird to possess so unusual a power? I will leave it to others to determine, making but a single suggestion with reference to it. Having closely observed the habits of a pair of these birds during the entire summer, I learned that the habit is one eminently useful to the bird, and, I think, possessed by the male only. This I could not positively determine.

When it is recollected that many of our birds—notably the Mocker (*Mimus polyglottus*) and Cat-bird (*Galeoscoptes carolinensis*)—mimic not only the notes of other songsters, but sounds of almost every description, and that many gregarious birds post sentinels to give alarm on the approach of an enemy, it will be seen that the vocal powers of birds are not simply brought into play for their own satisfaction or that of their mates. During the lapse of ages, they have learned, through experience, something of the laws of sound, and know fully as well as man does that a loud note can be heard at a greater distance than one lowly murmured; for birds, when giving an alarm-cry, utter the note much louder than their ordinary chirps or song, which fact abundantly demonstrates the truth of my assertion. This knowledge of sound, simple as it is, is the starting-point for the acquirement, first, of mimicry, which is the intermediate stage of acquirement between ordinary vocal utterances, including songs, and that ventriloquial power which we have seen is possessed by the Chat.

Now, as this bird imitates very many sounds, it

seems clear that the power to do so must have been first acquired, and the addition to it, in being able to repeat the sound so as to make it seem as though uttered where the mimicked note is heard, constitutes the power in question. Such an addition to the power of mimicking other birds, and the cries of small mammals, would at once prove advantageous in misleading a pursuing enemy, as a small hawk; and the Chat would not be slow to learn this, and profit by the knowledge by constant repetition and practice. A bird readily appreciates the benefit it derives from any unusual circumstance or series of them, and will remember long, and endeavour to secure their repetition, so far as it was instrumental in bringing it about. In this way a new habit readily becomes characteristic of a species, first locally, and then throughout the entire range of its habitat.

About the middle of June the young birds had left the nest, but continued with the parent birds, and were fed by them. From this time until August 5th, when both old and young left the neighbourhood, I failed to detect any attempt even at singing on the part of the young; and the more marked features of the song of the parent birds were but seldom heard after the young had obtained a sufficient flight-power to insure their safety. Both the mimicry and the ventriloquism seem to be wholly exercised by the male in securing safety to the young and the female while sitting, if we except his occasional exhibitions on his arrival in spring, which are tests of his power, for his own satisfaction at first, and when the females arrive, proofs of it to theirs.

On the 15th of July a pair of Bewick's wrens *Thryothorus Bewickii*) appeared in and about one of my outbuildings, and in a day or two, having fixed upon a suitable spot for their nest, commenced carrying the materials necessary for its construction. As they were not at all timid, I had abundant opportunities of watching them while so employed, and I must admit that their *modus operandi* was very damaging to the poetry of birds' nests. After the first few strands of long, tape-like grass had been arranged upon the beam, the birds came together to the spot, each carrying a blade of grass or other equally flexible material. The female then sat in the unfinished nest, while her mate wound loosely about her the materials they had brought. This was repeated until the foundation of the nest, about an inch deep, was completed, when the female ceased carrying materials, but waited for her mate's return with such soft materials as he could find for the lining of the nest. This was simply placed upon the nest loosely, and not at all adjusted. When a considerable quantity had been piled up, the female "burrowed" into it, and turning round and round, succeeded in treading down a comparatively smooth depression in the floor of the nest, and the larger strands were rudely arched over her, but did not really form a roof. In three days the nest was completed, and was nothing better than any child could have made with the same materials by wrapping, winding, and slapping it over his fist. Not one particle of ingenuity was displayed at any time. On the fourth day the first egg was laid, and on this day a cat succeeded in catching the male bird. As the female did not seem to miss him very much, and it was this mishap which made the subsequent study of the nest and the female bird possible, I thanked the cat for the interference. The widowed wren wandered about quite as usual, constantly uttering a very cheery chirp, and gathering up a goodly quantity of insects every day. One egg was laid each day, until four had been deposited, when she commenced sitting. The fourth egg was pure white; the others of the usual hue and markings. An interesting physiological feature of the case might be profitably discussed, but will here be but briefly referred to. This species of Wren usually lays from seven to nine eggs, and hatches them all. Did the influence of the male only reach to the third, or possibly the fourth egg? Of the four eggs laid, the last one did not hatch, and I judged from its contents that the yolk had been imperfect. Again, did the death of the male bird indirectly cause the shell of the fourth egg laid to be wholly colourless? The season was too advanced to make any experiments during the remainder of the summer.

After the young were a day old, the parent bird was seldom seen except for a moment at a time, when it would dart into the workshop through a knot-hole, carrying a beetle larva or caterpillar, and giving it to them, off she would go again, usually to the roof of another building, and there chirp and fairly scream, fluttering about in a distressed manner, as though determined to make the passers-by believe she had a nest anywhere except in the spot really occupied. This habit was so marked in all its features as to attract the attention of the whole family; and when the workshop, which was continually visited for a few moments at a time during the day, was occupied on her arrival with food for her young, she would dart out as rapidly as she came, and go through her accustomed antics on a distant roof, the while retaining the food for her young in her bill. By the 12th of August the young had left the nest, and in a day or two they left the neighbourhood.

The song of the male Wren is, I think, very fine, and far more melodious than that of *Troglodytes ædon*, the common house-wren of our country. But there is not in it, or in the utterances of the female, any trace either of mimicry or ventriloquism, and I could not but recall the advantage the Chat had in remaining comfortably at home and sending his voice on an errand, when I saw the anxious Wren labour with both voice and body, and with all her

might, to make her supposed enemies believe her painfully-acted and harshly-uttered lie.

A word with reference to her nest. This species of Wren usually builds a very commodious and neat nest, and in a concealed spot; not, as in this instance, on the top of a window-frame, in full view, like a pee-wee's nest. It was, really, an instance of what is constantly to be seen in nest-building,—carelessness and laziness on the part of some individuals of every species. In my studies of thousands of birds' nests, I have found it to be true that an exposed position will be chosen occasionally, because the twigs and branches so grow as to lessen the labour of building the nest. Birds are "smart" in many ways, but have their weaknesses, too; which fact, I think, is one of the strongest arguments in favour of the theory (?) that their mental powers are identical with those of mankind, differing only in degree. In consequence of our early education, this becomes difficult to believe; but, indeed, could we obliterate from our minds all knowledge of even the word "Instinct," when we enter the haunts of birds, a fuller and far more correct knowledge of them could be obtained in one summer than has been gathered since the days of Linnæus.

Considerable comment having been made with reference to my note on the eggs of the Yellow-bird (*Chrysomitris tristis*), in the 6th vol. of this magazine, wherein I stated that about thirty per cent. of the eggs had yellowish-brown and sometimes purple marks, I determined to take copious notes of the colouring of the eggs of all our breeding birds during the spring and summer of the last year; and I will conclude this article with a brief *résumé* of my observations, and the conclusions I derived from them.

In making a classification of my notes on the eggs observed, I found, first, that birds laying white eggs *in small numbers*, as the Yellow-bird and Pee-wee (*Sayornis fuscus*), vary a good deal, in that occasionally a single egg, or oftener the full complement, will have some dark markings about them; while, on the other hand, birds that ordinarily lay marked eggs occasionally lay one, or a whole "sitting," pearly white; as the Grass-finch (*Poöcætes gramineus*) and the Song-sparrow (*Melospiza melodia*).

Secondly, that birds like the Quail (*Ortyx virginianus*) and the Woodpecker, laying large numbers of white eggs, do not vary at all.

Thirdly, that birds laying a small number of dark-coloured eggs, as the Cat-bird, Robin, and Wood-thrush (*Turdus mustelinus*), frequently lay a whole series of much lighter hue than usual, but never any exhibiting well-defined marks upon them.

Fourthly, that *supernumerary* eggs, with white shells, are not unfrequently deposited; and these I believe are, as a class, infertile. I have found them in the nests of our chipping Sparrow, the Lob-o'-link (*Dolichonyx oryzivora*), Blue-bird, and Great-crested Flycatcher (*Myiarchus crinitus*).

I believe, therefore, that the colour and markings of eggs are so far variable that no nest can positively be identified by the eggs alone, and not always if both the construction of the nest and the markings on the eggs are considered. We all know how "geographical races" of a species vary as to both size and colour, and this is equally true of the nests and eggs.

NOTES ON QUILL-WORTS (*Isoetes*).

SINCE the date of my notice of the *Isoetes Hystrix*, *Duriæi*, and the Guernsey plant, in SCIENCE-GOSSIP of November last, p. 258, my attention has been drawn to the Flora of France and Corsica (1855) of Grenier and Godron, containing full descriptions of all the Isoetes found within those limits, including the *I. Duriæi*, Bory, and the *I. Hystrix*, Bory, Durieu, and Cosson, which quite confirms my statement that the Guernsey plant is not the *I. Hystrix*, Bory.

Fig. 7. *Isoetes Hystrix*.

The Isoetes are there classed in three divisions. First, the *Aquaticæ*, which include the *I. lacustris* only. Secondly, the *Palustres*, comprising *I. tenuis-*

Fig. 8. *Isoetes Duriæi.*

sima, Boreau, *I. adspersa*, Braun (*Perreymondi*, Bory), and *I. setacea*, Delille. Thirdly, *Terrestres*, comprising *I. Hystrix*, Bory, Durieu, and Cosson, and *I. Durieu*, Bory.

The *Aquaticæ* have *no scales* (phyllopodes); the *Palustres* also have no scales; the *Terrestres* have the rhizome covered with persistent scales. The *I. Hystrix* has the bulb surrounded by short, black, shining scales, terminated by two long linear subulate horns (spines), between which often appears a third, very short. The *I. Duriæi*, Bory, has the bulb also surrounded by scales, only very short, black, largely truncated, and shortly tridentate (no spines). The distinctions are thus clearly defined, showing that no species that has not the spines can be the *Hystrix*. The Guernsey plants sent to me have no spines, only scales, therefore if not the *I. Duriæi* (or a sub-species), must be a distinct species. The *I. Duriæi* taken in Algiers is very large in comparison with the Guernsey plant, from growing in a pure, soft, sandy soil, allowing the bulb to expand. The

Fig. 9. *Isoetes Duriæi* (Guernsey plant).

specimens from which the illustrations are taken agree with the foregoing respective descriptions.

Brighton. T. B. W.

CEMENT FOR DRY-MOUNTING MICROSCOPIC OBJECTS.

THE very frequent occurrence of slides becoming defective, either through the covers or cells coming off or from the cement running in or letting in the air, induced me about a year and a half ago to send a communication to the editor of SCIENCE-GOSSIP on the subject (and which appears at p. 131 of the volume for 1874), intending to give the results of many years' experience by stating what I had found to be the most reliable materials; but illness occurring, prevented its completion at the time, and being followed by disinclination and want of energy, this led to its protracted postponement. In that paper I stated my aversion to the use of gold size, as a most objectionable element, from its tendency to run in, owing to its not hardening *throughout*, but only on its exterior surface; and at the same time making allusion to a new material which bid fair to be of great value as a substitute; and, fortunately, the time which has now elapsed enables me to confirm most fully the favourable opinion originally formed as to its merits. This varnish was first introduced to my notice by Mr. Ackland, as his colourless cement for fixing covers, &c.; and immediately on its composition being imparted to me in confidence, I at once recognized its importance in the place of gold size, and having prepared some liquid asphalt with this varnish, in lieu of the gold size, I set to work to test its appli-

cability and its results, and it is satisfactory to find that it has proved to be all that could be desired.

In the days of the old monocular microscopes, thin cells and translucent objects were chiefly required; but since the introduction of the binocular, deeper cells and both wet and dry mountings of considerable size have to be provided, and it is no very easy matter to devise means of resisting or compensating expansion and contraction in these more bulky receptacles; for if the cement be too hard, the air will obtain access, and if too soft or yielding, the cement itself will be gradually drawn in and become equally disfiguring, a defect specially pertaining to the gold size when mixed with cement; and the desideratum was to find some substance which should retain a slight degree of tenacity without the same disposition to spread or run, and this merit Ackland's varnish appears sufficiently to possess.

For cells requiring to be attached to the glass there are three substances, namely, glass, metal, and paper, which are most to be relied on: the two former may be fixed down with *marine glue*, but there are innumerable objects for which properly prepared paper rings or cells are admirably adapted, as being both convenient and economical, and which may be fixed down with less trouble by cementing, and be equally durable and safe. Ebonite cells were at one time strongly recommended; but these have been discarded, owing to the almost impossibility of attaching them to the glass in a sufficiently secure manner.

For the method of making these paper rings and cells, the reader is referred to p. 16 of the same volume (1874).

Requiring to mount a dry preparation in a deep cell, and having the latter securely attached to the glass slide, place the object in its centre, and take care that the whole be perfectly dry before proceeding, and close it up; but when this has been attained, and the slide properly centred upon the turntable, form a ring of the cement upon the edge of the cell,—letting it stand up as *a prominent ridge* rather than be spread evenly over the surface. Now pick out a proper-sized cover, and by the time this has been sufficiently cleaned and ready for use, the cement will be in a fit state to receive it, when it may be dropped into its place, and slightly pressed down to make it adhere enough to avoid shifting when the slide is handled. As the cement will have become too hard to be pressed into shape without warmth, heat a plain glass slide as hot as it can be held, and then placing it upon the cover nip the two together between the finger and thumb until the whole of the cement forms one entire black circle without any interrupting fissures, which may be known by their being lighter in colour.

By attaching cells or covers in this way by means of heat applied to a half-set cement, two advantages are derived; first, the heat necessary to soften the cement secures its firm adhesion to the glass, and, next, from its being in a half-dried state, it is, when cool, sufficiently tenacious to resist the solvent powers of additional coats of varnish or cement, and is thus deprived of the tendency to be sucked in by any exhaustion of the cell's atmosphere. To insure security it is always better to give one outside coating of the thin varnish, embracing both a small portion of the slide and of the upper surface of the cover, before setting it aside to complete the drying.

In using this asphalt varnish there are two points requiring attention; in the first place it must not be applied in too thick a state, as under these circumstances it does not work with the proper freedom, and in the second place it must not have fresh benzole added at the time of using, for it will then be found to be knotty or lumpy. The best plan is to have several one-drachm vials with it, sufficiently thin for use, and when one has become unworkable, to add benzole, and put it aside for another, until its turn shall have come round again.

In the putting up of snake objects in dry cells, one of the greatest troubles experienced by careful mounters lies in the extreme difficulty of securing the absence of dust, and other extraneous matter from the interior of the cells and the underside of the covers. There is one circumstance affecting the cause of this disposition to accumulate foreign substances upon the surface of glass which, if generally known, is very commonly neglected. Let a stick of sealing-wax be rubbed briskly on the coat-sleeve for a second or two, and then be presented to any light substances, such as small pieces of paper, feathers, or cotton threads, &c., and these will be seen to instantly start up, and adhere to its surface. Now as glass is also an electric, and can be excited in the same way, it stands to reason that when a cover is rubbed either with silk, linen, leather, or any similar substance, it will be made to attract dust, and other bodies floating in the air of the room, or resting within reach of its influence. Acting upon this principle, and after trying numerous plans, the following has been adopted as proving the most successful.

Take an eighth part of a sheet of stout blotting-paper, and roll it up firmly into a cylinder about as thick and as long as an ordinary cedar pencil, binding it round with a piece of plain paper, gummed or pasted at the last coil, to keep it compact. When dry, cut off one end square and the other obliquely, so as to present a flat point or edge; after which rub the cut surfaces on a rather smooth file, or scrape them with the edge of a knife, so as to render them soft and fluffy, like the pile on the face of velvet.

Next, procure a flat cork or bung, about two inches in diameter, and over one of its surfaces stretch a piece of soft, thin wash-leather, tying it around the edge, so as to form a table for receiving

the covers after they have been cleaned and rendered fit for use.

The last requirement will be a small india-rubber bottle or ball, with a fine tube or pipe to enable it to be used as a syringe or "bellows," to blow off the dust, &c., which is the final operation in cleaning.

Being thus provided, we are now ready to commence operations, and as the covering glass for dry cells must necessarily be of sufficient thickness to resist some degree of pressure, the covers will be strong enough to bear a fair amount of careful handling, therefore they may be taken up and held by the edge, between the thumb and two or three fingers, so as to present one of the surfaces upwards. Let this surface, as well as the end of the paper rubber, be strongly breathed upon, and then with gentle friction the glass may be rendered beautifully clean and clear, after which let it have three or four strong puffs from the blower, and be instantly inverted upon the wash-leather table, having first blown off any dust which may have gathered upon it. Here it may remain until wanted, when it can be taken up by a three-pointed needle forceps, and dropped on to its place and adjusted for completion.

Blotting-paper has been found to cause the least degree of excitation in the glass, as well as being very efficient in producing a brilliant surface without injuring it, while any fibres remaining are readily dispersed by the blast of cool air, which is also very effective in destroying any electrical attraction, which may have remained in the cover. For clearing the covers of slides during examination these paper rubbers are most serviceable, but in cleaning the lenses of eyepieces, &c., they are unequalled, and when accompanied by the blowing process, the plan is invaluable, especially with the "Kelners," where the slightest particle of dust forms a highly obtrusive blemish, but which can thus be readily avoided.

W. K. Bridgman.

Anagallis arvensis. — In Lord Bacon's works I find it written, "There is a small red flower in the stubble fields, which country-people call the wincopipe, which, if it open in the morning, you may be sure of a fair day to follow." This description seems to refer to *Anagallis arvensis.* Is that flower known by such a name now in any part of the country? It is not mentioned by Dr. Prior, but perhaps some of your rural readers may be acquainted with it, and can explain its origin.—*F. W.*

The History of the Moon. — "The moon exhibits in high relief an advanced stage of the fiery history of our earth. There the process of cooling has gone so far that even volcanic action has ceased."—*Ennis's Origin of the Stars.*

MICROSCOPY.

An Ingenious Turntable.—At the annual *soirée* of the Oldham Microscopical Society, recently held, there was an exceedingly large and creditable array of objects. A noticeable feature in the exhibition was a new and most ingenious form of turntable, made by Mr. Charles Butterworth, of Shaw, by the aid of which cement cells, so invaluable in microscopic mounting, could be made with the utmost precision and despatch, and that too not only in the circular but also in the elliptical form, of any size from 2 in. in length to 1 in. in width, reducible until a perfectly straight line was produced; by its aid also a thin glass cover could be held in position on a cell so made whilst the finishing ring or rings of cement were added. The invention excited much attention, and was considered by the members as the most complete appliance of the sort yet introduced.

Fitting High-power Object-glasses.—What is the method of fitting a high-power object-glass purchased separately from a microscope, so that it shall be accurately in centre?—*H. W. E.*

Varnish for Microscopic Cells.—Your correspondent "W. G. C." asks for a recipe for the white varnish used in ring shells. The following was given to me by a scientific instrument maker. Ingredients: chloroform, gum dammar, white oxide of zinc, and boiled oil, the same as used by colourmen. The gum dammar, is dissolved in chloroform; just sufficient oil is mixed with the oxide of zinc to make the powder into a coherent mass, the oil and powder being worked together in a mortar. The thick paste so formed is put into the chloroform solution, the mixture being well shaken. Experience alone will instruct the maker in the quantities of the ingredients. To make coloured varnishes, instead of oxide of zinc, vermilion, Prussian blue, emerald-green, or even lampblack may be used, according to the colour required.—*R. S. T.*

Finishing Varnish.—In reference to "W.G.C.'s" query about a good white or coloured finishing varnish, in December's number of Science-Gossip, he may be glad to know that I tried last year, and, as far as I can see, successfully, the ordinary oil colours in tubes; they are easily used, and can be thinned with turpentine, or any of the mediums in use amongst artists; of these, however, I think "drying-oil" is the best, as it dries firmly, and is not apt to become sticky in hot weather. Of course the fast-drying colours are to be preferred, flake-white, vermilion, French ultramarine, emerald-green, all dry well, and dry better if mixed with flake-white. A white varnish consisting of nitrate

of bismuth and mastic varnish is given in "Davies on Mounting," but I have not tried it. These varnishes I know are against Dr. Carpenter's advice, in the way of containing solid particles; but his caution does not refer, I should say, to finishing varnishes. In reference to mastic varnish, I saw a statement some months back in SCIENCE-GOSSIP, that gum mastic was not soluble in turpentine; I am certain this must be an error, if the turpentine is good, as I have dissolved mastic myself in it. It is not worth while, however, to do so, as it is easily bought good from artists' colourmen.—*J. G. P. Vereker.*

THE REFLEX ILLUMINATOR.—Will some of the readers of SCIENCE-GOSSIP give their experience in the use of this piece of apparatus? I have been able to do the following:—with a $\frac{4}{10}$ths, $\frac{1}{5}$th, and $\frac{1}{10}$th immersion by Gundlach, I get very good results, on a dark field, with some *few* objects, as insect scales and diatoms. Of the scales I succeed best with *Lepisma* and *Podura*, the latter exhibiting structure invisible by other modes of illumination. With regard to diatoms, *P. formosum*, *decorum*, and a few others come up well, even with the $\frac{1}{10}$th immersion, when mounted in balsam; when dry, I fail altogether. I have had a single specimen of *Heliopelta* mounted for me; this, under the $\frac{4}{10}$th, shows more beautifully than with the paraboloid. Some of the *Aulacodisci* exhibit quite a new appearance when the light falls upon them under a certain angle. All the objects require to be mounted on *clean* slides, and with covers free from striæ, and the best effects are obtained when a single object is in the field of view. I should think Mr. Kitton might give us a hint, for I feel confident that its powers are not yet developed.—*P.*

CEMENT IN GLYCERINE.—"J. R. T." appears to doubt the efficacy of the cement recommended by "F. K." for keeping in glycerine. I can with confidence recommend it. I have found no other cement to answer the purpose. There are two hundred objects in my cabinets mounted in glycerine, and sealed with gold-size, thickened with a mixture of white and red lead and litharge. These were mounted principally in 1869 and 1870, and at present they are all sound, with the exception of two, which were defective from the first. It is curious that "J. R. T." should use crocus of iron in his gold-size in opposition to Dr. Carpenter's instructions.—*S. L. B.*

INTERFERENCE OF LIGHT.—Some time ago I was bothered in the same way as J. G. R. Powell, by the reflection of light from the sides of the tube of the microscope, when using the second eye-piece. This was, however, completely done away with by the insertion of a "stop" or "diaphragm" within the tube, cutting off the reflected rays.—*B. B. W.*

ZOOLOGY.

"MISSING LINKS" AMONG THE LEPIDOPTERA.—M. Künckel has described in the "Comptes Rendus" several Australian Lepidoptera which possess terebrant trunks, instead of the usual sucking probosces we have always regarded as characteristic of the order. Having read in a newspaper the depredations of a moth (*Ophideres fullonica*) on oranges, he carefully examined the trunks of these insects. Lepidoptera are specially constructed to suck up the nectar of open flowers, and to imbibe sweet fluids. M. Künckel goes on to say:—"By a strange exception, the moths of the genus *Ophideres*, Boisd., possess a rigid trunk—a true borer of ideal perfection—capable of piercing the skins of fruits, and of boring through the thickest and most resistant envelopes. This trunk is a perfect instrument, and would be an excellent model for the making of new tools to be employed in boring holes in various materials. Partaking at once of the barbed lance, the gimlet, and the rasp, it can pierce, bore, and tear, at the same time, allowing liquids to pass without impediment by the internal canal. The two applied maxillæ terminate in a strong, sharp, triangular point, furnished with two barbs; they then become enlarged, and present on the lower surface three portions of the thread of a screw, while their sides and their upper surface are covered with short strong spines, projecting from the centre of a depression with hard and abrupt margins. The purpose of these spines is to tear the cells of the orange-pulp, as the rasp serves to open the cells of the beetroot, in order to extract the sugar from them. The upper region of the trunk is covered below and on the sides with fine close-set striæ, arranged in half-screws, which give it the properties of a file; the striæ are interrupted here and there by small spines of soft consistence, which serve for the perception of tactile sensations. The orifice of the canal through which the liquids ascend is situated on the lower surface below the first screw-thread. Not content with examining *Ophideres fullonica*, Linn., I investigated all the representatives of the genus, and found that *O. materna*, Linn., *O. salaminia*, Cram., *O. imperator*, Boisd., as well as the other species, have a powerful trunk in the form of a borer. The structure of the maxillæ, therefore, furnishes a generic character of great value; moreover it establishes a closer relationship between the Lepidoptera, the Hemiptera and certain Diptera in which the maxillæ are destined to pierce tissues. The Australian colonists dread *O. fullonica* on account of the mischief caused by it in the orange plantations; for the fruits which it pierces with holes quickly spoil, and soon fall to the ground and rot. All the Lepidoptera of the genus *Ophideres* being, as I have just shown, furnished with a terebrant trunk, it is incontestable that they have similar

habits, and that they will bore into oranges and other fruits. As they are very widely diffused in tropical regions, they must justly be ranged among injurious insects. Unfortunately their early stages are unknown, so that no really practical method of destruction suggests itself to the mind; but their large size and striking colours, allowing them to be recognized at the first glance, they may be killed without any fear of reproach for committing a judicial error."

Popular Natural History Books. — Our position with regard to "Geological Stories," "Half-Hours in the Green Lanes," and "Half-Hours at the Seaside," prevents us doing more than stating, for the information of numerous inquirers who applied in consequence of not being able to procure them, that all have passed into *new editions*, and may now be obtained in the ordinary way through any bookseller, or from 192, Piccadilly.

The Marine Aquarium.—We are pleased to note that the able paper by Mr. W. R. Hughes, F.L.S., President of the Birmingham Natural History and Microscopical Society, has been neatly published (with illustrations) by Van Voorst, London. The principles and management of marine aquaria, large and small, are set forth with the utmost clearness, and the kind of objects best suited to keep up the necessary self-adjustments are described. The book will be a handy manual to aquarium-keepers.

The Lepidopterist's Calendar.—Our young entomological students cannot do better than procure this cheap and handy little work, which has just reached a second edition. It is written by Mr. Joseph Merrin, and published by Herbert Marsden, Regent-street, Gloucester. It comprises nearly 300 pages, and gives the time when the British lepidoptera appear in the egg, larval, pupal, and imago states, together with the food-plant of each species, and their habitats. The information is most handily arranged under the different months of the year, beginning with January. We know of no other book in which so much convenient knowledge is packed so methodically away.

Habits of Rabbit.—A coastguard-man reports that he saw a rabbit attack a weasel with such courage and fierceness as to compel it to beat a retreat. Perhaps it was a mother unwontedly bold in defence of her young. On reliable authority I am told that a rabbit, an old doe, on being hunted by two young spaniels, swam across our river Camel, at Carrion Pit, a deep pool, and was soon after killed on the opposite side. An intelligent country friend has just sent me the head of a rabbit, with its lower incisors grown to the length of an inch and a half. In this case it was probably owing to some congenital want of adaptation of the upper and under jaw, whereby the cutting edges of the rodent teeth were not brought in apposition. The upper incisors were of the natural length. The animal was, in fact, "underhung." Such a deformity may sometimes arise from faulty development of the teeth, or accidental dislocation. Jenyns, in his interesting "Observations in Natural History," mentions occasional instances of this monstrous prolongation of the incisors. The Museum of the Cambridge Philosophical Society has a specimen in which the lower teeth are developed to the length of two inches and one-eighth. The rabbits mentioned by Jenyns had, when taken, the appearance of being starved to death: mine was shot while running with great activity, and was in very fair condition.—*Thomas Q. Couch, Bodmin.*

Note on the Betony Weevil (*Cionus scrophularia*).—During a Saturday afternoon ramble along the road leading from Woodford to Chingford, a few weeks since, my attention was directed to a small piece of water beside the footpath, not much above the dignity of a ditch, on the edge of which some plants of Water Betony (*Scrophularia aquatica*) were growing. I noticed that the leaves were eaten through and through, while some nettles close by were more completely intact than nettles commonly are. On turning up the ragged leaves I found a few sluggish-looking beetles, less than a quarter of an inch in length, black, with yellow spots, and with lengthened beaks, which proclaimed them to be of the Weevil family. Looking further, I discovered a number of oval cocoons, brown and membranous, and attached in most cases to the under-sides of the leaves, but in other cases to the upper surface, and also to the flower-stalks, on which the seed-vessels were now ripening. The questioned remained, who were the depredators? Was it the beetle, or the larvæ which had now passed into the pupa state, and had made their curious cocoons, or some other devourers which had decamped? Closer inspection showed that some of the cocoons were empty, the integument having cracked all round near the upper end, except at one point, so as to form a natural lid to the tiny box; others still contained a dark body dimly visible through the membrane. The shape of the cocoon resembled that of dipterous insects, and some of the ichneumonidæ, but quite unlike the closely-fitting envelope of the Coleoptera. However, *fiat experimentum* appeared to be the best motto, and a number of the cocoons were speedily boxed, together with two or three of the weevils, for further examination. On reaching home I soon made out the latter to be the *Cionus scrophularia* of entomologists; and in a few days several specimens of the same insect emerged from the cocoons. On referring (among other works) to the *English Cyclopædia*, I found that the four [five]

species of Cionus found in this country inhabit plants chiefly of the genera Scrophularia and Verbascum; that they construct cocoons thereon, and that the larvæ are yellow and gelatinous. It was thus tolerably clear that the latter were the devourers of the betony-leaves; and thus an outline of this little insect's life-history appeared to be afforded. I could not fail to be struck with the curious mode of opening which characterized the cocoon,—an arrangement similar to that found in one of the Hemiptera (a field-bug), and figured in Rennie's now almost-forgotten volume on "Insect Transformations." Nor was it less remarkable to note the close resemblance of the cocoons to the brown seed-vessels of the Betony, whether closed or open, rendering it easy to mistake the former for the latter. Possibly these brief jottings may possess some little interest for the entomological readers of Science-Gossip. At least I hope so.—*W. H. G.*

Sparrows and Peas.—When I resided in the town of Cirencester, I experienced great difficulty in growing peas, for as soon as the leaves began to expand, they were eaten away down to the petiole, as the gardener said, "by they mischievous sparrows." Well, we adopted all sorts of expedients to keep the birds away, but I was surprised to find that the more successful our efforts in this direction, the faster and surer was the destruction of the young pea-plants, and this led me to look carefully at the peas, when it was found that the leaves were notched in a peculiar manner, as though by the gnawing of an insect, and not like the pecking and tearing of a bird, and upon closer inspection I soon found the creatures at their work in the shape of a small beetle, *Sitonia* (*Curculio*) *lineata*,—Striped Pea Weevil,—and we believe that the whole of the mischief to our peas was done by these creatures, and that the sparrow, so far from being the delinquent, was, indeed, aiding us to get rid of the pest, which we let him do unmolested for the future, save the little disturbance we gave him in drawing an insect-net over the ranks of peas in bright, sunshiny weather, by which means we caught the insects, and ever after saved our crop. Since that time we have seen whole fields of peas all but destroyed by this creature, and even in our crop of this year, which was tolerably successful, the insects were so abundant as to enable us to take up hundreds at a time from the rim of the carter's hat, who was pitching them on the waggon. We find lime, soot, or finely-powdered road-dirt, or all mixed together, dusted over the crop in early morning, while the dew is upon it, discourages the insect, probably by rendering its food unpalatable; but, be that as it may, they usually fly off to some other pea, or it may be clover crop, after the first dressing.—*J. Buckman, Bradford Abbas.*

On Collecting and Preserving Hymenoptera.—In answer to Mr. Hallett, I have no doubt his plan is good, but still it has so many disadvantages that I would not advise a tyro to try it. In his criticisms of my paper, he complains of the complications of cyanide, boxing, chloroforming, and then sulphuring. I have found stupefying with the cyanide-bottle is the quickest and safest method of getting these insects into the box, which should never contain more than a single insect; indeed, Mr. Smith says, when he has captured a rarity, he incloses that box again in a larger one. Some caution is needful in boxing such insects as the humble bees, wasps, and hornets, whose stings in the female and neuter are really formidable. Mr. Hallett does not tell your readers how he gets them into his box. He hints at killing them with chloroform; this should never be attempted, as it renders them so rigid that it is extremely difficult to set them. The store bottle he recommends, I think, should never be used, because many of the bees differ in one sex, whilst the other greatly resembles the same sex of another species, which may be taken at another time of the year; this is particularly the case with the males of some species of Andrena, and by being mixed thus higgledy-piggledy in a bottle of laurel-leaves, all evidence of time and locality is lost; another reason is that all insects killed with cyanide or laurel-leaves, or allowed to remain in either any time, are apt to mould on the slightest provocation; it is far better, if there is not sufficient time to set all, to pin them, with a label bearing all particulars, and afterwards, if required, damp them, and then set them. With regard to his observations on killing them with sulphur, I can only say it is the method recommended by Messrs. Fred. Smith, Shuckard, and E. Newman, all old hymenopterists of note, as the best for preserving the colours, and leaving the insect perfectly lax for setting. As to the drawing of the insect set with the table braces, I should have thought it was unnecessary to observe that that is a vagary of the artist, who is evidently not an entomologist, as it would be very troublesome to set the insect with the legs as represented in the woodcut. The string plan may be good, but in that one has to arrange two pins instead of one in the table. From the observations of Mr. Hallett, if he had not stated he has collected these insects, I should have thought that beetles or bugs had occupied his leisure, and not bees and wasps.—*John B. Bridgman.*

BOTANY.

An Operative Botanist.—There has just died one of those remarkable men who, we are thankful to say, abound in Lancashire and Yorkshire, and who devote their leisure to the practical study of

natural science. Mr. James Walker, of Mossley, was one of these. As a botanist he had no superior in his district; and his kindly disposition and willingness to assist those of his class who were desirous of "knowing something about plants," drew round him a host of sincere and earnest disciples, who followed him to his grave in November last. This is very meagre tribute to Mr. Walker's talents and moral worth, but we are thankful to pay it. Nearly every large town on the borders of Lancashire and Yorkshire has its botanical society, where a stranger would be surprised to meet with an amount of knowledge rarely to be seen elsewhere.

The Rarer Species of Dianthus.—From a note in last month's Science-Gossip it is pleasant to know that the scarcest species of Dianthus in our flora (*D. cæsius*) is not only far from being extinct at its sole station, Cheddar, but that lady botanists do not fear to scale precipices to obtain it—we hope soon to persuade ladies to join the West Sussex Natural History Society;—and this is very encouraging. The pretty *Dianthus Armeria*, with its bright red petals, is to be found here; but *Dianthus prolifer* is one of our rarest Sussex plants. Can any one inform me if it occurs in plenty elsewhere than in Jersey, or spare me a specimen from any of its six habitats?—*F. H. Arnold, LL.B.*

Parietaria officinalis.—I have lately observed a very singular phenomenon in the flowers of Pellitory-of-the-wall. The stamens of the flowers of this plant have their filaments fixed upon themselves, and are partly concealed by the corolla, the anthers alone being perfectly visible. Whilst examining a specimen, I happened to touch one of the filaments with the point of my knife, when suddenly it unbent itself with some degree of force; at the same instant the anther burst, and a cloud of pollen was discharged into the air. Upon further examination I found that only those stamens whose pollen was ripe could be made to perform this curious feat.—*H. C. Crew.*

Curious Poppy Flower.—A correspondent most kindly sends us a peculiar variety of the Corn Poppy (*Papaver Rhœas*, L.), in which one petal is of the normal colour, the opposite one on the axis is a clear white; then the other two opposite ones, on the floral axis, are streaked claret-colour and white intermingled. This to us remarkable flower was found in a field at Kingston, Hants, amongst barley; probably hundreds of others in the same field were of the usual colour, whilst the present example, certainly a very uncommon colour, shows this strange freak of nature. We should feel most grateful if all our readers who are botanists would pick up any species they meet with in their rambles possessing any peculiar abnormal formation in either leaves or flowers. The past autumn has been very prolific in these teratological specimens. As they are sent to us, if deserving of notice, we shall both figure and describe them, so as to extend our limited knowledge of this branch of botany. Very few persons seem to know much about it, but a good chapter on "Vegetable Teratology" is as deeply interesting to read (better, we hope, to most readers) than the best work of fiction ever published.

Mealy Surface of Chenopodiaceæ.—Instead of indulging in vague speculations, such as that about "pure ammonia" by your correspondent in Science-Gossip, No. 131, p. 260, the cause of the mealings of the Chenopods should be investigated by rational examination. Almost everybody with

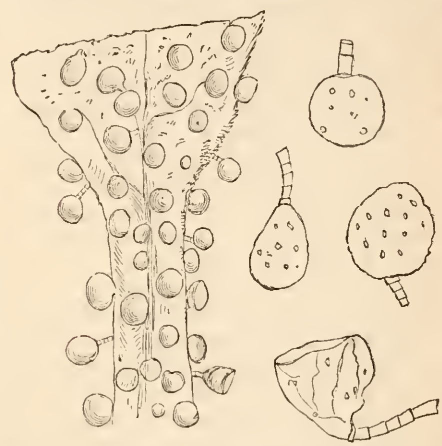

Fig. 10. Utricular shining hairs of *Chenopodium Olidium.*

the slightest pretension to natural science has a microscope, and a very poor instrument would at once show that the white, glistening appearance on the leaves and stalks of these plants is due to the pubescence. The whole subject was demonstrated, by drawings and preparations, at the meeting of the East Kent Natural History Society, Dec. 4, 1873, noticed about that time in several periodicals, including, I think, Science-Gossip. On the occasion mentioned, as recorded in the report given in the *Quart. Journ. Micros. Science*, April, 1874, Professor Gulliver proved that the so-called mealiness of the Chenopods is produced by simple hairs of two or more cells, the terminal cells being dilated into a globular vesicle, numbers of which so vividly reflect the light as to produce the white and glistening appearance. And hence Mr. Gulliver called this pubescence "utricular." It is really a beautiful object when viewed by a low power on a dark ground and reflected light. The accompanying rough sketch shows a portion of the leaf and its stalk, studded with these utricular hairs, as seen under an inch objective; and to the right are four detached hairs, more highly magnified, the lower one of which is collapsed.

GEOLOGY.

Remarkable Fossil Orthopterous Insect from the Coal-measures of Britain.—This was the subject of a paper read at the London Geological Society, by Henry Woodward, F.R.S., F.G.S. The author commenced by indicating the importance of the examination of the clay-ironstone nodules of the coal-measures, in which so many valuable fossils have been discovered, including the remarkable insect described in the present paper. The specimen displays the characters of the four wings, only two of which, however, are nearly perfect, and these measure 2¼ in. length, and 1 in. and 1¼ in. in breadth, the hind wing being the broadest. The author described in detail the characters presented by the venation of the wings, which includes three straight veins running parallel to the fore margin, the third bifurcating near the apex, a fourth much curved vein giving origin to six branches, and having at its base a triangular space, from which arise the other veins of the wing. The body appears to have been about five lines broad between the bases of the wings. In front of the wings is the prothorax in the form of two large, rounded, dilated, and veined lobes; it measures fourteen lines across and six lines in length. In front of these lobes is the head, with its eyes produced in front into a slender process three lines long. This insect is considered by the author to be most nearly related to the Mantidæ, the characters of the head and thorax especially being to some extent paralleled in the existing genus *Blepharis*. The author proposed to name the species *Lithomantis carbonarius*, and suggested that *Gryllacris* (*Corydalis*) *Brongniarti* probably belongs to the same genus.

The Discovery of a Fossil Scorpion in the English Coal-measures.—This was another paper read at the same meeting by Mr. Woodward. The author commenced by noticing the various European and American localities in which fossil Arachnida have been found in the coal-measures. Hitherto, no true scorpions have been recorded from the English coal-measures; but in 1874 the author received from Dr. D. R. Rankin a specimen from the coal-measures near Carluke, which he regarded as the fossil abdominal segment of a scorpion; in April last he obtained a fossil scorpion from the Sandwell Park Colliery; and in August Mr. E. Wilson forwarded to him several specimens of similar nature in clay-ironstone nodules from Skegby New Colliery, near Mansfield. The specimens are all very imperfect; but the author states that they most closely resemble an Indian form, which is probably *Scorpio afer*. He refers the English species provisionally to the genus *Euscorpius*, Meek and Worthen, and proposes to name it *E. anglicus*.

The Forest-bed Series at Kessingland and Pakefield in Suffolk.—This was the subject of a paper read at a recent meeting of the Geological Society, by John Gunn, Esq., M.A., F.G.S. The author described a section from the cliff at Kessingland and Pakefield, from the examination of which he arrived at the conclusion that the Forest-bed series underlies the Chillesford clay and sands. At the foot of the cliff there is an estuarine deposit forming the soil of the forest-bed, consisting of blue clay and gravel, the "Elephant-bed" of the author's former paper. Above this is the forest-bed, containing large stools and stems of trees, but no fossil bones. This is followed by a freshwater deposit, consisting of black soil with freshwater shells corresponding to a similar bed at Mundesley and Runton, known as the "*Unio* bed," and including the "Rootlet bed" of oozy clay, regarded by Mr. Prestwich as an indication of the forest. The author considers the supposed rootlets to represent brushwood, which succeeded the true forest. Above this come fluvio-marine deposits, in which crag shells occur, although but rarely. To this division the author was inclined to refer the Norwich Crag, which at Bramerton underlies the next division, regarded by the author as the Chillesford clays and sands. Of the overlying deposits the first is supposed to be the "Pebbly bed" by the author; it has been regarded as middle drift, and the uppermost is upper boulder-clay. The paper was illustrated by the exhibition of a fine series of bones, chiefly cervine, from the lowest deposit noticed by the author.

Metropolitan Scientific Association.—On Saturday, November 6, about fifty members of this society paid a visit to the Surrey Commercial Docks for the purpose of viewing the geological features of interest disclosed during the excavations now being carried on there. The Rev. E. Josselyn Beck, M.A., conducted the party over the ground, and his lucid explanations and general courtesy added greatly to the pleasures of the visit. The cutting is about 40 feet deep, and about halfway down is a very excellent section of an ancient forest-bed, several trees remaining *in situ*. Below this is a band of silty clay, and this has been found especially rich in mammalian remains; and still further down are the lower level gravels. One of the most important results of the visit was the discovery of what, on further examination, will doubtless prove to be a line of fault hitherto unsuspected. To Professor Morris, who accompanied the excursion, the members were greatly indebted for an admirably lucid outline of the tertiary deposits, as illustrated by the section around them. Mr. Beck had very kindly caused to be placed in an adjacent room the remarkable collection of fossils discovered in these excavations; after viewing which the company passed a vote of thanks to the rev. gentleman for his kindness.

GEOLOGY OF COLCHESTER.—A capital paper on the above subject has just been read by Mr. W. H. Dalton, of her Majesty's Geological Survey, before the members of the Colchester Natural History Society. The paper consisted of a *limine* sketch of nearly new geological ground, including chalk, Thanet beds, Reading beds, London clay, red crag, glacial and post-glacial deposits.

MIDDLESEX CHALK.—I beg to inform "W. H. G." that there are some extensive chalk-pits in Harefield, some in use, but many are abandoned. The old chalk-pits are very interesting to the botanist and geologist. The nearest railway stations are Uxbridge and Rickmansworth; the latter is preferable, as the chalk extends more in that direction.—*G. H. Seward.*

GUIDE TO THE GEOLOGY OF LONDON. — We are glad to see that a second edition of this clearly-written and well-arranged little manual has been so soon called for. The author's large work on the "Geology of the London Basin" has been laid under contribution, and its most important features re-appear in the present book. All the various formations in the neighbourhood of the metropolis are described; the places where the best sections are to be seen, and where fossils are to be obtained, are also severally mentioned. The student of London geology could have no better guide than the author, Mr. W. Whitaker, F.G.S., who is justly regarded as one of our best authorities in field geology. We are further glad that the book has been such an unexpected success, as it will convince the Stationery Office (if that is the bureau to which we should look) that the English public would gladly purchase the "Memoirs of the Geological Survey" if they would publish them at a more reasonable price. The present Guide is published at a shilling.

PROCEEDINGS OF SOCIETIES.—We are pleased to notice that the Watford Natural History Society bids fair to take one of the most prominent places among provincial societies. The list of members includes some well-known names, so that in this respect the society has an advantage over many others. In the second part of the Society's "Transactions" the papers are devoted to natural phenomena, the first part being almost exclusively geological. Mr. John Hopkinson, F.G.S., has one on "The Observation of Periodical Natural Phenomena," and Mr. J. E. Harting, F.L.S., another on his favourite topic of Ornithology. The Glasgow Natural History Society have also published the first part of the second volume of their "Proceedings." It contains several geological papers,—"On the Mode of identifying Tertiary Fossils," by Mr. D. Robertson, F.G.S.; "On the Extinct Fossil Shells *Bellerophon* and *Porcellia*," by John Young, F.G.S. The latter geologist also contributes other papers, on "An Arctic Shell-bed at Cartsdyke"; the "Parallelism of the Irish and Scotch Carboniferous Strata," &c.; whilst Dr. John Grieve has a paper on the "Fossils from the Leaf-beds of Mull," and Mr. James Coutts one on the "Post-tertiary Clay-beds at Kilchattan Bay, Bute."

THE SHEFFIELD MUSEUM.—We are very sorry to see that, owing to a difference between the curator of this museum, Mr. C. Callaway, B.Sc., and one of the committee, the former has tendered his resignation. Mr. Callaway is perhaps better known among American geologists than English, on account of his knowledge of American fossil brachiopoda. The main cause of difference (which seems to us to have taken the form of persecution) was that the member of the committee aforesaid thought less of "old bones, and things of that sort," than Mr. Callaway did. The question should be asked by those who love science in Sheffield—What right has such a man on the committee?

NOTES AND QUERIES.

COLOURS OF CROCUSES.—I saw lately a correspondent (E. J. Scott) stated he had known crocus flowers to change colour, a fact I can vouch for. Some years back I planted a quantity of blue and yellow crocus; the first and second years they were true to colour, after that time they were *all* yellow. —*Thos. Thirkel.*

TADPOLES OF NEWT.—Allow me to state that in December's number of SCIENCE-GOSSIP "H. E. F." contradicts himself by saying that "the tadpole of the newt has gills and a tail during part of its life, and develops its *hind* legs first." Then a little further down he says that "the tadpole of the newt has a tail permanently, gills during part of its life, and develops its *front* legs first." The front legs make their appearance first, and about three weeks afterwards the hind legs. I draw attention to this, because such a mistake in a magazine like SCIENCE-GOSSIP would, in all probability, be likely to lead amateurs in natural history astray.—*A. F. Maingay.*

SPAWN OF FROGS AND TOADS.—The article by "G. S.," on the above subject, published in our GOSSIP for November, will, I feel sure, be a welcome addition to the knowledge of those who, like myself, are just beginning the study of the interesting phenomena of development. In the early part of last year I obtained a number of tadpoles of the frog (*Rana temporaria*) from a pond in the neighbourhood of Manchester. When first caught, the legs had not made their appearance on any of the specimens; but after I had kept them for about ten days, the whole of them exhibited the hind legs in various stages of development. During this period the tail of each specimen grew shorter, and by the time when the fore legs were fully developed, had almost entirely disappeared. My tadpoles, however, were not suffered to arrive at maturity. About the end of June, on looking into my aquarium, I observed one of them lying dead at the bottom, and covered

with a downy white substance, which I supposed to be a fungus. Before night I found two others dead and covered with the white substance; and the next morning the whole of them were dead. On removing them I found that the fungus, if it be such, had completely enveloped their bodies, and the stench which arose from them was horrible. This was not the first time I had had this horrid pest in my aquarium, for I have had several lots of fish killed in the same way, and should feel very grateful to any of the readers of SCIENCE-GOSSIP who make aquarium natural history their special study, if they would tell me how to get rid of this chief of aquarium pests. I think "G. S." has done well in exposing the popular fallacy respecting the disappearance of the tails of tadpoles. It is not long since I heard one of our most eminent naturalists assert that the tails of tadpoles dropped off when they were no longer needed. This statement was made to a class of students, of whom I was one. P.S.—Frog-spawn was observed at least a week earlier than usual, last year, in several ponds in the neighbourhood of Manchester. Has this been general throughout the country?—*H. C. C. M.*

NEWTS.—In SCIENCE-GOSSIP of Nov. 1st "G. S." makes some inquiries about the development of newts. Perhaps the following may interest him and others of your readers. On the 2nd of April last, I got, from Covent Garden market two female newts; the one a warty, and the other a smooth one; both of which I placed in a small aquarium. On the 3rd the smooth newt laid three eggs, and on the 4th five more. On the same day the warty newt also laid several. When first laid the eggs were white, and those of the warty newt about the size of a mustard-seed, covered with a thin coating of albumen, which in a short time absorbed water, and swelled to a quarter of an inch in length and one-sixth in breadth. I several times saw the warty newt in the act of laying her eggs. She first went to a leaf, and appeared to smell it, and, if she found it suitable, she drew herself over it, and bent it across the thick part of her tail with her hind feet. The leaf was then held against the opening of the oviduct, and the feet clasped over it. The newt seemed to compress the oviduct laterally with the feet, until the egg was expelled into the fold of the leaf, which was then held lightly round it until the leaf had stuck to the albumen of the egg. This generally took from three-quarters of a minute to a minute, and during that time the newt seemed quite insensible, allowing itself to be touched without moving. Two eggs were sometimes laid at the same time; but I have never seen one with a double yolk, each egg having its own outer covering, which swelled out, and separated it from the other. The smooth newt did not lay any more, but the warty newt laid about thirty eggs within the week, only six of which hatched. On the 20th April I had three more female warty newts sent me, one of which went on laying eggs up to the 4th May, which shows that newts do not all lay their eggs at once. I have seen fresh-laid newts' eggs taken from a pond as late as 14th June. One of the eggs of the smooth newt hatched on 27th April, but the tadpole died the same day. Another hatched on 20th. When first hatched, the young newt was in a very undeveloped condition, its eyes being scarcely visible, and the under jaw much shorter than the other. It had three unbranched gills on each side of its head, and two other smaller projections, which may have been the rudiments of the fore-legs, but of that I am not sure. For three days the young newt did not eat anything, but swam about and fixed itself to the sides of the aquarium, &c., apparently by its mouth. It then began to eat small water-fleas and the larger infusoria. On the 14th May the fore-legs were well developed, and the hind-legs were distinctly visible about the 1st June, at which time the gills had six branches each. The young newt lost its gills, and left the water on the 7th July. I had some smooth newts' eggs in 1874, which hatched in twenty-one days. The eggs of the warty newt took, this year, about thirty days to hatch. The young of the warty newt takes longer than the smooth newt to develop its legs, and considerably longer to absorb its gills. The Rev. S. A. Brenan inquires how to feed newts. I always put the food into the water, and leave it there, but not long enough to become putrid. The best food is worms; but, failing those, raw beef or mutton, cut into thin strips about $1\frac{1}{2}$ inch long, will do very well. It is most amusing to watch the newts smelling about for the meat. They seem to know that there is food somewhere about; and they snap at each other's feet and tails, and anything else that they come to. I once saw one almost choke itself with a red carnelion, which lay near a piece of meat. Newts will eat water-woodlice, and most other water insects; and the warty newts will eat the smooth ones, if very hungry, and their own young. The smooth newts get much tamer than the warty ones. Two of mine would eat from my fingers when out of the water. Sticklebacks and newts should not be kept together. The sticklebacks give the newts no peace, continually biting their tails and eyes, and finally killing them. They also eat newts' eggs if they get the chance. "The bright silver shade" referred to, is, I think, the air which adheres to the dry skin of the newt when it goes into the water. I have often noticed it.—*A. H. Searle, Kensington.*

LATE FLOWERING LABURNUM.—In last October number of SCIENCE-GOSSIP "J. W. G." speaks of having observed a laburnum-tree coming into flower in the last week of August. I also noticed, about the end of September, a laburnum in this town covered with blossom; the tree did not appear, however, to be making new wood, as mentioned by your correspondent.—*H. T. R., Stockton-on-Tees.*

THE BUTCHER-BIRD.—Although *Lanius colluris* and *Lanius excubitor* are said to impale their victims on thorns, and devour them at their leisure, still I do not think this is correct. It is certain that they have great power in their toes, and hold their prey in one foot, resting on their tarsal joint. They sometimes make great havoc amongst young birds, and have even been known to carry off very young and weakly pheasants. This genus shows a very marked affection for its young, and will attack even hawks in their defence.—*E. Lovett.*

COMMON CROSSBILL.—If any of your readers have had the good fortune to find the nest and eggs of the common Crossbill (*Loxia curvirostra*), will they oblige by giving information concerning the structure and situation of the nest, a description of the eggs, the time of nidification, or any other peculiarity they may have noticed?—*W. Petch, Heeley, Sheffield.*

THE BUFFALO.—In support of what your correspondent "Centurion" says, with reference to the poor buffalo at the "Zoo," I quote the following from

an old work on natural history:—"Sometimes are found in herds of considerable numbers, frequenting moist and marshy situations, and preferring the coarse vegetation of the forest and swampy regions to that of open plains. They swim well, and cross the broadest rivers without hesitation." There is certainly great difficulty in providing the advantages of nature for animals in confinement, but it should be done as near as possible.—*E. Lovett.*

The Greenfinch.—Can any one inform me of the use of the small ball-like elevation in the upper mandible of the Greenfinch (*Coccothraustes chloris*)? —*T. Jackson.*

Charlton Sand-pit.—In answer to the query of "W. H. G." respecting the present condition of Charlton Sand-pit, I may say that I have been there several times geologizing, and have never met with any objectionable treatment, but, on the contrary, with the greatest civility, the workmen being always ready and anxious to sell specimens.—*F. B. Linley.*

Swallows in November.—I think it is not a very common occurrence to find swallows in November. They had left here (Bath) about the middle of September, and some were seen during October, the thermometer ranging, on the north side, in the open air, from 40° to 42° at eight a.m., and 46° to 50° in the middle of the day, the whole of that time with northerly or easterly winds mostly. On the 3rd of November, however, the wind came from south-west to south, thermometer 52° to 54°, at eight a.m. and 60° to 65° middle of day; sky cloudy, but clearing at two o'clock, the air feeling warm, and even close. At four o'clock, to my astonishment, I noticed twenty to twenty-five swallows (the small species) performing gyrations just as in summer. I had no time to watch them; but half an hour after I found they were gone, and the sun was behind the hills. Now the question is, where did they come from? Had they returned with the warm wind, or only remained behind in some warmer part of the country?—*C. H. Macco.*

Fishes and Barnacles.—In the stomach of a Smooth Blenny (*Blennius pholis*), about three inches in length, I found four specimens of the shell of the common Acorn Barnacle (*Balanus balanoides*). Could any one inform me as to how a small fish could obtain a creature usually so firmly fixed to the rocks as to require a hammer or stone to remove it? These crustaceans may frequently be found on the shells of the mollusca, or on the carapace of crabs, &c. Is it probable that the fish swallowed them in conjunction with, perchance, a small crab, the comparatively thin shell of which was dissolved by the acid of the stomach before I opened it; or is it more likely that the barnacles might have been torn off the rocks by some other agency, and then swallowed; but if this were so, they must have been eaten very quickly after the disengagement, or they would have been dead, and would, I suppose, not have been so palatable.—*J. S. A.*

Gilbert White's "Selborne."—I am surprised to see that your correspondent "Vagans" proposes that Mr. Buckland should tamper with his forthcoming edition of White's "Selborne." What is the book worth if it is not left as White wrote it? As far as I can see, any one who tampers with the book tampers with White's name as a naturalist. What is there in it that a naturalist of the present day, writing on the same subject, would not mention? "Vagans" must learn that books on natural history are natural histories, and not books for the drawing-room table. We shall be very glad to see White's lately-discovered letters in the new edition; but as to expunging matter, the act would be criminal.—*Adrian Peacock, Amcott's Rectory, Doncaster.*

Irish Antiquities.—Mr. G. H. Kinahan's fig. 154, in the ninth of his admirable sketches of Irish Antiquities, reminds one of the sepulchral mound or cairn at Newgrange, some four or five miles from Drogheda. The stone basin at Newgrange is somewhat oval, and about 4 ft. in diameter, much resembling that depicted by Mr. Kinahan in Science-Gossip, and with a variety of sculpture on the adjoining stones, some of which is of a form like the circular figures on the stones of the chamber at Slieve-na-cailllighe. But this Mr. Kinahan describes as post-Christian, whereas the mound or cairn at Newgrange is commonly supposed to be ante-Christian, and, indeed, of unknown antiquity. However this may be, the whole structure at Newgrange is one of the most wonderful in the United Kingdom, far more so than any structure of the kind ever found in England or Scotland. Probably Mr. Kinahan will favour your readers with an accurate description of Newgrange.—*G. G.*

"Veronica" (Speedwell).—"*Veronica*" is believed to have originated in the legend of the Roman Catholic Church respecting the "Veronica," who was the same as "Berenice." The word is from the Greek, and means a "Sacred Picture," the blossom having been fancied to bear a representation of the countenance of our Saviour. A handkerchief, superstitiously believed to have belonged to this St. Veronica, was preserved at St. Peter's, in Rome, and is said to have been used by our Lord on His way to the crucifixion, and to have the impress of the sacred lineaments.—*E. E.*

Late Martins.—On the 16th of November I noticed four martins flying under the shelter of some beech woods, near High Wycombe. Don't you think it late for them, and do these late birds leave England or lay up during the winter in some hollow tree or hole in a bank?—*J. L. H.*

Cats and Frogs.—We had a cat which was very fond of playing with frogs. She would hunt about the garden until she unearthed one, and pat it on the back until it leaped away with a loud squeak. I have often observed her doing this, but on no occasion did she attempt to eat the frog, and I never could discover that she injured it in the least.—*J. P. Blackett, jun.*

BOOKS, &c., RECEIVED.

"Climbing Plants." By C. Darwin, F.R.S. London: John Murray.

"The History of Creation," 2 vols. By Prof. Haeckel, edited by Prof. Ray Lankester. London: H. S. King & Co.

"Elementary Botany." By W. J. Browne, M.A. Belfast: W. Mullan.

"Time and Time Keepers." By J. W. Benson. London: Hardwicke.

"Our Place among the Infinities." By R. A. Proctor. London: H. S. King & Co.

"The Universe." By F. A. Pouchet. London: Blackie & Son.

"The Canary Book." By R. L. Wallace. London: "Country" Office.

"The Origin of the Stars." By Prof. Ennis. London: Trübner & Co.

"Monthly Microscopical Journal." December.

"American Naturalist."

"Land and Water."

"Ben Brierley's Journal."

"Journal of Applied Science."

"Les Mondes."

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

F. E. S.—The specimen sent is a myriapod, not uncommon on damp hedge-banks, called *Geophilus electricus*. It has no relation whatever with the glow-worm.

J. S. A.—Get Frank Buckland's work published by the Christian Knowledge Society, entitled "Familiar History of British Fishes," price about 5s.

P. H. G.—Many thanks for your kindly interest. The suggestion shall be attended to.

G. B. W.—See a note in the June No. of Science-Gossip, page 139, headed "To Clean Corals." That will give you the information you require.

R. C.—It is very certain that the live frogs got into the "cavity of the stone" by some means, although "no crevice or fissure could be found," and equally certain that the live frogs have not been hybernating there since the carboniferous period, millions of years ago! We have seen several instances of "live frogs and toads" having been found in "solid rock," but every examination proved they had crept there to hybernate.

C. S. K.—You will obtain all the information you require by addressing Mr. E. Newman, 9, Devonshire-street, Bishopsgate.

G. G.—It is not an unusual thing to see dipterous flies and even wasps sipping the dregs or "heel-taps" of wine-glasses.

J. P. S.—The specimen is a variety of the common Hawthorn (*Cratægus oxyacantha*), having extraordinary large berries.

F. Coles.—The minute red fungi on the bark of the twig sent are a species of *Sphæria*.

W. H. B.—Get Mr. W R. Hughes's little book on "The Management of the Marine Aquarium." (London: Van Voorst). You will there find, on page 34, how to prepare artificial sea-water.

R. S. T.—We have not heard that spiders are fond of the berries of the yew. Wasps have a particular liking for them, and their sweetness probably attracts many species of fruit-feeding flies.

W. J. B. and W. R. H.—Thanks for your kindly suggestions.

Bats.—Any reader of Science-Gossip, knowing any haunts (caverns or otherwise) of bats will oblige by communicating with "H. L.," care of the editor of Science-Gossip, 192, Piccadilly, London.

John Turner.—The specimens forwarded in a bottle seem to be, as regards the pteropod, most nearly allied to *Limacina antarctica*, but coming from Davis Straits, in the arctic regions, we should not expect it to be the same species. The shell soon drops off in *L. antarctica*. The Crustacean is an *Amphipod*, and seems to be a species of *Gammarus*.

W. H.—We do not think Dr. Carpenter's Lecture to the working men of Bristol during the meeting of the British Association, on "A Piece of Limestone," has been published, except in the Bristol newspapers during the above occasion.

Zoophytes.—The packet of eighteen different kinds of Zoophytes, &c., sent to be named some time ago, are as follows:—No. 1. *Salicornaria farcimmoides*; 2. *Sertularia argentea*; 3, 11, and 4. *Sertularia abietina* with *Spirorbis nautiloides* and *Sertularia rosacea*; 5. *Sertularia cupressina*; 6. *Antennularia anlennina*; 7. *Antennularia ramosa*; 8, 13, and 10. *Fluslra truncata*; 9. *Cellularia reptans*; 12. *Crisia eburnea*; 14. *Membranipora pilosa*; 15. *Membranipora pilosa*, *Eucratea chelata*, and *Leporalia annulata*; 16. *Sertularia pumila*; 17. *Cellularia avicularia*; 18. *Leporalia trispinosa*.

EXCHANGES.

Five foreign insects, a Prawn, and two specimens of the common Hydrocampa, for British Crustaceans or Water-beetles.—J. H. B. Brooke, 21, Willington-road, Stockwell, London, S.

Rubus Chamæmorus, offered for other plants.—W. J. Hannan, 6, Tattan-street, Ashton-under-Lyne.

For a portion of wing of *Bombyx Yama-mai*, send a stamped directed envelope to W. H. Gomm, 2, Oak villa, Mattock-lane, Ealing.

The large American Silk-moth, *B. cecropia*, and the large China Silk-moth, *B. Dernyi*, for Birds' Eggs, &c. Parties not hearing in three or four days may conclude their offers are not accepted.—John Thorpe, Spring-gardens, Middleton, near Manchester.

Good Lepidoptera, also Rare and local Plants, offered for Birds' Eggs.—Wm. Jordan, Cockfield, Sudbury, Suffolk.

For Chalk-washings from Gravesend, send stamped directed envelope to Dr. G., 3, Woodville, Gravesend.

Funaria hygrometrica, *Bryum argenteum*, var. *lanatum*, &c., for other Mosses.—Address, Mrs. S., Brentford End, Middlesex, W.

For six species of Zoophytes, unmounted, send other good Microscopic Objects to R. H. Philip, 28, Prospect-street, Hull.

Wanted, Hardy Ferns, Bulbs, or Bulbous-rooted Plants, for Micro Slides or Material. Lists exchanged.—R. J. Lund, 26, Commercial-street, Leeds.

For pinnule of *Nephrolipsis exaltata* with Sori, send stamped directed envelope to H. E. Perry, The Bank, Long Eaton, Derbyshire.

Side-blown Eggs of Great Crested Grebe, Shag Cormorant, Woodchat, Shrike, and Short-toed Lark, for other good (side-blown) Eggs.—W. Petch, Heeley, Sheffield.

For specimen of Sheine (for the Polariscope), send stamped envelope to F. Coles, 248, King's-road, S.W.

For Slide Spores of *Aregma bulbosum*, Bramble Brand, mounted in damar, send good Slide to Wm. Goodacre Cokayne, Forest-road East, Nottingham.

Sections: Four well-cut, unmounted sections (Orange, Lemon, Pepper, and Olive Trees), for each good Slide of Insects, Diatoms, &c., for good unmounted Material.—H. L., *Chronicle* Office, Wolverhampton.

Well-mounted Microscopic Slides, various, for others of good quality. Lists exchanged.—J. Ford, Newbridge-crescent, Wolverhampton.

Send well-mounted Slides for eight Exotic Butterflies' Wings; quantity of Slides for exchange. The wings all different, if preferred.—W. Tylar, 165, Well-street, Birmingham.

Wanted, Plants suitable for an aquarium; will give healthy Plants of Sundew, *Drosera rotundifolia*.—Address, G. T. F. Napier, Alderley Edge, Cheshire.

Correspondents wanted abroad to exchange British Birds' Eggs for those of foreign countries.—J. W. Dealy, 142, Clarence-street, Sheffield.

Two Slides of Fossil Infusoria, for one of selected and named Diatoms.—Thomas Lisle, Villers-street, Wolverhampton.

A Collection of Chalk Fossils of about forty specimens, containing Wood, Teeth, and Bone, for a good Microscope.—H. B., Castle Acre, Brandon, Norfolk.

Cladophora rectangularis, *Sphacelaria sertularia*, and various interesting fruited and diatom-laden Marine Algæ, mounted in balsam and other mediums, or for herbarium, or prepared for mounting in Balsam; and other interesting Material, including Foraminifera, Diatoms, Zoophytes, Star-fish, Scorpion Crabs, Holothuria, Parasites, &c., for Polariscope, Slides, &c.—T. McGann, Burrin, co. Clare.

A well-mounted Slide of Uric Acid Crystals will be forwarded for any other really well-mounted Slide.—Address, J. C. T., 4, Lord-street, Liverpool.

Many American deposits of Diatomaceæ, for others, Slides and recent Gatherings; Moron Earth wanted.—Dr. A. M. Edwards, Newark, N.J , U.S.

For exchange or otherwise, a 4-in. object-glass by Ross, and an Achromatic Condenser, in perfect order.—Apply to Rev. J. Bramhall, St. John's Vicarage, near Lynn, Norfolk.

A Baker's Erecting Prism and a very fine Tourmaline, for a Webster's Condenser, a Swiss Condenser, Kelner Eye-piece, and a Polariscope.—W. Statham, Green Bank, Shottle, near Derby.

Mounted Specimens of Globigerina, Spines of Echini, &c., from the *Porcupine* soundings, for various unmounted Microscopic Material. — C. P. Ogilivie, Sizewell House, Leiston, Suffolk.

Wanted, 7, 11, 164, 375, 626, 832, 1359, 1361, 1362, 1596, for 79, 165, 169, 173, 234, 835, 1284, 1387, 1391, 1595, 7th edition Lon. Cat.—F. H. Arnold, Fishbourne, Chichester.

Offered: 60, 85, 120, 182, 512, 776, 1006, 1471, 1513, *Petasites albus*, *Poa sudetica*, &c., for 5, 25, 32, 62, 119, 255, 353, 564, 593, 598, 600, 698, 737, 907, 997, 1105, 1222, 1223, 1305, 1370, 1410, 1484, 1552, 1553, 1564, 1577 and b, 1597, 1655, 1656, &c., Lon. Cat., 7th edition; also Lowland for Alpine Willows.—A. Brotherston, Shedden Park-road, Kelso, N.B.

Communications Received up to 12th ult. from:—G. G.—F. K.—J. F.—J. B. B.—G. H. K.—W. K. B.—E. E.—F. E. S.—J. R. S. C.—C. H. M.—W. P.—E. L.—W. E.—F. A. A.—M. M.—J. B.—H. T. R.—T. J.—T. B. L.—J. P. B.—F. C.—W. H. G.—J. H. U.—E. M.—B. B.—G. O. H.—C. L.—A. H. S.—R. F. K.—Dr. A. M. E.—P. H. G.—A. M.—T. L. C.—F. G. H.—C. D.—H. C. C. M.—S M. P.—G. A. S.—R. J. L.—J. F. R.—J. T.—G. B. W.—G. M. D.—A. P.—J. B.—C. W. S.—J. B. B.—R. C.—H. C. R.—C. S. K.—G. S. F. N.—R. W.—T. Q. C.—W. S. A.—W. B.—Dr. G.—T. L.—J. C. T.—S. W. D.—A. J. R. S.—F. H. A.—R H. P.—W. S.—A. F. M.—F. W.—T. G. P.—H. P. M.—J. H. B.—G. G.—A. J.—J. P. S.—C. W. S —J. E. L.—T. G. P. V.—W. T.—D. N.—A. B.—R. E.—F. C.—W. G.—J. F.—H L.—B. B. W.—E. W.—T. McG.—G. H. H.—H. E. P.—J. P. B.—W. P.—Dr. P. Q. K.—H. F., jun.—W. H. B.—R. S. T.—T. T.—T. E.—F. C.—E. H.—M. S.—J. B.—W. J.—L. L. B.—R. T. L.—W. H.—G. E.—N. P.—E. B. S.—H. E. W.—W. H.—F. H. W.—&c. &c.

HISTORY OF OUR CULTIVATED VEGETABLES.

No. XV.—THE CARDOON (*Cynara cardunculus*).

THE Cardoon, or *Chardoon*, belongs to the same class and order as the Artichoke, which it very much resembles, but is of a larger and more regular growth. It is a native of Candia and the South of Europe, but we have no notice of its cultivation in our current authors. It was introduced into England about 1683, aud first cultivated by Mr. James Sutherland. Parkinson, in his "Pardis," states that he was assured by John Tradescante that he saw three acres of land about Brussels planted with this vegetable, the leaves of which the owners whited like endive, and sold there in winter. Townsend, in his Tour through Spain in 1786, mentions that in some parts of that country they never use rennet for cheese, but substitute the down from *Cynara cardunculus*, from which they make a strong infusion over-night, and next morning they mix half-a-pint to fourteen gallons of milk warm from the cow. In the present day the French peasantry carefully dry in the shade the flowers of this plant, and of the artichoke, to use for the same purpose. Cardoons are cultivated for the table in many parts of the Continent, but not much esteemed in England, as it is stated they are rather troublesome to grow in this climate, and depend so much on the skill of the cook to render them palatable.

John Baubin affirms that the Cardoon is a hybrid plant, or mule from the seed of the common artichoke.

This plant has the same name, with slight variations, in several languages of Europe: as Kardouen, Kardon, Cardone, and Cardon.

No. XVI.—THE JERUSALEM OR GROUND ARTICHOKE (*Helianthus tuberosus*).

This plant is a production of the warmer parts of the Western hemisphere, and consequently unknown to the ancient Greeks and Romans. Sir James Smith says, in his "Introduction to Botany," that the name of this vegetable is a corruption of the Italian name Girasole Articiocco (Sunflower Artichoke), and was first brought from Peru to Italy, and thence propagated throughout Europe. This tuber, which is more agreeable than profitable, was first cultivated in England during the reign of James I., as we are informed that in the year 1617 Mr. John Goodyer received two small tubers, not bigger than a hen's egg, from Mr. Franqueville, of London; one he planted, and the other he gave to a friend. His own brought him a peck of tubers, wherewith he stored Hampshire; but he remarks that they are meat more fit for swine than men. This note bore the date of October 17, 1621. From this it appears that this vegetable was introduced into England by the French, who met with them in Canada, as Parkinson, writing in 1629, mentions them under the head of Battatus de Canada, the French Battatus, or Jerusalem Artichokes. Coles also, whose work was printed only forty years after they were known in this country, called them the Potatoes of Canada; but we are informed in Martyn's edition of Miller, that "they were so called because the French brought them first out of Canada into these parts; not that Canada is their original country, for they are unquestionably the produce of a hot climate, being natives of Brazil."

In Parkinson's time they used to be baked in pies with marrow, dates, ginger, raisins, larks, &c., but

the facility with which they increased by cultivation made them so plentiful and cheap in London that even the common people despised them, although when first introduced they were said to be a dainty fit for a queen. In the "Bath Society Papers," vol. iv., Mr. Nehemiah Bartley, near Bristol, in 1787, gives an account of some experiments he made in cultivating this plant as an agricultural crop, and states they are about equal in value to potatoes for feeding young pigs. But their chief recommendations are the certainty of a crop, as they will flourish in almost any soil—in the corners of fields and other waste places. Under favourable circumstances, ten to twelve tons per acre have been grown.

The stems of this plant grow to a considerable height, and their fibre might probably be found valuable for making paper; the leaves are stated to contain nitre. In the tubers a chemical substance is found, called Inuline, which is organized, according to Raspail, like common starch, but stands, to a certain extent, in opposition to that substance, which it replaces in the root system of the composition, and has not been detected in any other tribe. Iodine gives it a yellow tint. Inuline was discovered by Valentine Rose in 1804. The Jerusalem Artichoke multiplies very quickly, and is with difficulty cleared out of the land where it has once been planted. It very seldom blossoms in this temperate climate; the flowers resemble a small sunflower.

HAMPDEN G. GLASSPOOLE.

NAVAL NATURAL HISTORY.

On first going to sea, now many years ago, fresh from college, and with that usual smattering of natural history which our medical students then received—consisting, for the most part, of long words, the meaning of which was not always clear to them—I was frequently astonished to find how little I knew of the popular aspect of the science which was my favourite study, and had sometimes to blush for my ignorance before the old "salts" on board, more especially as to my knowledge of ichthyology. Such occasions have led me to think that did the professor of natural history take a hint from his botanical colleagues, and institute excursions, say to Billingsgate or the Brighton Aquarium, once or twice during the session, he would teach more on his fish subjects than he possibly can from the mummified or wizened-looking specimens which he exhibits in the class-room; or, at all events, the student would learn more of the *popular* names of his "subjects," which he would find of infinite use in pursuing his after-studies.

The man-of-war's-man is a good practical natural historian; and as the entomologist and botanist may learn many things from the children in the green lanes and by the hedgerows, so the lovers of the fish world often find valuable instructors in the working fisherman or the old sailor. But "Jack's" natural history is not exactly that of the schools; at least not of the modern schools. His is more of the Gilbert White type—a few plain, well-ascertained facts, a little mythology, and a terse vernacular nomenclature, constituting his stock-in-trade. His learning is chiefly of a traditional order; for although he has roamed over the world, and mayhap spent a quarter of a century on the "briny" without having ever seen a sea-serpent, yet his faith in the existence of the great "ichthyophidian" is unbounded; for "Did not all hands see it on board of the old Dædalus?" His classification is not quite modern, for no amount of argument would convince him that a whale is not simply a "big *fish*"; indeed, not long since, a post-captain in the Royal Navy openly challenged the writer for proofs to the contrary. Their nomenclature, too, is sadly defective; the term dolphin, for instance, may signify one of three animals, two of them belonging to widely different genera; but it is only an advanced individual who applies this term to the long-snouted cetacean *Delphinus*. The porpoises and dolphins which disport themselves round the ship in shoals, are variously termed "grampuses," "porpuses," or "bottlenoses," and it is for the scomberoid *Coryphene* that the term "dolphin" is usually reserved by sailors. Of "black fish" there are many; two belong to the Scomberidæ, *Scomber thynnus*, or the well-known Tunny-fish, and *Centrolophus morio*, a spindle-shaped fish about eighteen inches long, sometimes found on our own coasts, and which is perhaps best entitled to the appellation, being of a blackish colour on the body, with intensely black dorsal fins. Two Atlantic *Physeter tursio* and *Grampus Cuvieri*, and two Pacific delphinoids, *Globiocephalus intermedius* and *G. macroryhncus*, also answer to the name, the latter being the "black fish" of the South Sea whalers; but the animal to which the term is most commonly applied is, no doubt, Cuvier's grampus. The young naturalist in the Mediterranean will not always recognize his "flying-fish" in the spiny-finned *Dactylopterus*, which can be said to "fly" through courtesy alone; this attribute being properly applied to one of the Pike family, *Exocœtus volitans*, which both astonishes and amuses by its long, rapid, and graceful flights when evading its pursuers; and, *apropos* of this fish, of which probably more has been written than of any other, I believe I have myself observed, and have been confirmed in my observations by many intelligent seamen, that the *Exocœtus* not only has the power of altering the direction of its flight whilst in the air, but is also able to rise from a lower to a higher altitude without either re-entering the water or wetting its wings. This, however, has long been a disputed matter.

Collingwood, in his "Wanderings of a Natu-

ralist," enters fully into the subject, and shows that the curve described by the fish in its aërial course is not a parabolic one, which it would be were the primary *impetus* the sole force expended, and there is certainly nothing either in its specific gravity, length of pectoral fins, or muscular development, from which we can *primâ facie* deny the power, albeit limited, of true flight to this harassed denizen of the deep. However, further observation would be welcome on this *quæstio vexata*.

The term "Portuguese man-of-war," although generally referring to *Physalia*, is also, and commonly, in the Mediterranean applied to the more highly-organized Argonaut, Paper Nautilus, or Paper Sailor, as it is called; and here I think the blue-jacket gives the more sensible appellation, for whilst the former animal is powerless against the wind and the tides, the latter can hoist its sails, with outspread tentacles "paddle its own canoe," and like some of our modern ironclads even settle into the depths of the ocean upon slight provocation!

How many "devil-fishes" there are I have not yet determined,—probably a good score; the title to the rank being earned apparently by anything big and ugly. In England the sailor applies the term to the *Lophius piscatorius*, or Angler, also to the Octopus and larger cuttles; but probably his original devil-fish is the *Cephaloptera*, or Horned Ray, an animal which, from its grotesque appearance, enormous power, and savageness when attacked, perhaps best deserves the name. In the Gulf of Mexico much sport is to be had in harpooning these fish, the strength of some being so great as to enable them to tow a man-of-war's gig with a crew of four or five men at a very considerable speed. Their vitality, too, is very great; I have seen them almost hacked to pieces before life became extinct, and on one occasion was towed a considerable distance in a large boat by one which had been thrice transfixed with a cutlass, and afterwards lost by its tearing itself from the harpoon.

Another large cetacean belonging to the genus *Raia*, met with in Jamaica and adjacent islands, also receives the common name of "devil-fish."

Although belonging to different genera and having well-known distinguishing marks, shrimps and prawns are almost convertible terms with seamen, the former name being applied to the smaller prawns, and the latter crustaceans when attaining a large size, as in the East Indies, become dignified by the name of Crayfish.

But, as I have said, Jack has no regard for classification or the dogmas of the schools, nor does his "master" much foster a study, the prosecution of which in a practical form is perhaps more easy for him than for any other class not endowed with wealth and abundant leisure. It is but too true, as a recent writer has remarked, that naval officers have been far outstripped in their contributions to natural science by their brethren in the mercantile service; and we had hoped that when that magnificent pile at Greenwich was converted into an educational establishment for the Royal Navy, a *niche* might have been found for the study of "Nature."

ROBERT NELSON, R.N.

THE MICROSCOPE AND MICROSCOPIC WORK.

No. II.—By F. KITTON.

HAVING briefly described our workman's tools, we will endeavour to give some idea of the work he did with them.

Our readers must not suppose that Leeuwenhoek ever wrote a book on "microscopy." He used his microscopes to enable him to see more of the structure of a plant or animal than the unassisted eye would permit him to do; and that is all a scientific man does at this present time. Microscopes, in fact, are nothing more than complicated spectacles, and often not half so trustworthy.

One of the subjects he treats upon is "the Oak." The following is the heading to the chapter:—"The Nature of its Production; the different Degrees of Goodness in Oak Timber, and the Causes of that Difference; the Author's Opinion as to the proper Season for felling Timber."

This chapter is illustrated by several copperplate engravings of magnified sections (transverse and longitudinal), all of them admirably executed. The figure of a portion of a transverse section is 11 in. in length and 4 in. in breadth, the actual size of the fragment being $\frac{1}{6}$ of an inch long and $\frac{1}{24}$ broad, an amplification of about 72 diameters. "This species of timber tree has five different kinds of vessels, three rising perpendicularly, and two extending or spreading horizontally. The insides of these vessels are full of a kind of vesicles or little bladders, composed of very thin membranes or skins. The second sort of these perpendicular vessels is much smaller, and is also composed of exceeding fine membranes intermixed with a kind of spots which, by the microscope, appear to my eye like globules or little balls. The third kind of these perpendicular vessels is exceedingly small, but in great numbers; likewise composed of excessively minute membranes. All the perpendicular vessels, which are found in so small a piece as that before represented, and which in size is about the ninetieth part of a square inch, do amount in number, in my opinion, to twenty thousand. So that an oak tree of four feet in circumference contains, according to my computation, more than three thousand two hundred millions of these perpendicular vessels.

"These perpendicular vessels do for the most part infuse or instil their juices into other vessels which are almost innumerable, lying in a horizontal

position in the tree, and by means of which its bulk or thickness is daily increased. These vessels are of two sorts; one sort of these horizontal vessels, which originally, or at the first formation of the plant, are derived from the marrow or pith in the centre of it, but afterwards in great numbers take their origin from the perpendicular vessels.

"These vessels appear to my eye like dark streaks (when seen in a transverse section), but, in order to examine them more closely, I cut a piece of wood lengthwise, so that they were cut exactly across, and then each of them appeared to be formed of five, six, or even seven vessels joined one to another, and intermixed among the perpendicular vessels.

"The other sort of horizontal vessels lie in great numbers or clusters closely joined to each other, though not evenly diffused through the wood."

Leeuwenhoek's figure represents a series of elongated cells, and he says, "I have in many places drawn cross-lines to represent what I conceive to be minute valves, and although I could not see them so distinctly as here they are drawn, yet I cannot doubt of their existence, having frequently seen these valves in other woods, and particularly very distinctly in the elm; besides it seems very evident to me that without such valves the tree could not be increased in bulk on account of the great force required to separate and loosen the bark from the tree in the time of spring, and also for the bursting open of the bark to allow for the growth and increase of the wood."

The remainder of the chapter is taken up with remarks on the value of various kinds of oak timber deduced from his microscopical observations, all of which tend to show that he made his microscopes subservient to the particular study he was then engaged in.

His observations on the oak are succeeded by a discourse on the microscopic structure of fir: "The different Degrees of Goodness in Fir Timber; how discoverable; the minute Vessels which enter into the Composition of this Tree described at large." It is unnecessary to give any extracts from this article, as it is similar to those already given. He gives a very good figure of the dotted ducts which he discovered. The minuteness of these vessels astonishes him, and he scarcely expects to be believed by those who have not seen them. He concludes by observing, "These discoveries of mine respecting the smallness or thinness of the vessels or tubes composing the substance of trees may not easily be credited by many, as not comprehending how, by reason of their exceeding smallness, any juice or liquor can possibly pass through them, and what is more difficult to conceive, how, through such vessels ascending perpendicularly, any nutritive substances can be derived from the root of the tree to the extremities of the upper branches.

"But as, on the one hand, it is out of the reach of our finite capacities to comprehend the extent of the Universe, so, on the other, we are equally unable to conceive the minuteness of the vessels and component parts of which not only animals but also vegetables are formed; and much less how the parts of matter are united together, or how one part grows out of or is added to another."

Leeuwenhoek was opposed to the theory of equivocal or spontaneous generation, as explaining the sudden appearance of living organisms where, apparently, they had not previously existed. The heterogenists have been driven from one stronghold to another, until they have only the Bacteria to fall back upon.

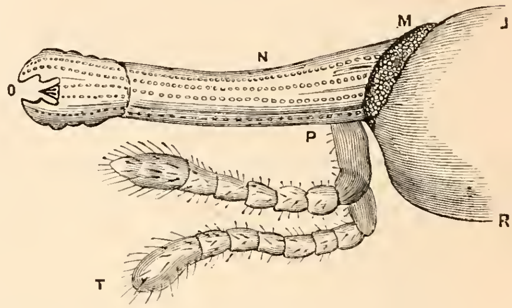

Fig. 11. Leeuwenhoek's figure of the Beak or Trunk of a Weevil. "L, M, R is part of the head; N, the proboscis (which is not so straight as here pictured, but appears bent down when seen sideways); O, the mouth, showing pincers or teeth. Within this mouth are two piercers or stings, one of which is seen in the figure. S, T are the two horns."

Leeuwenhoek, in his chapter on the Weevil, or corn-beetle, says: "I have heard it strongly argued that the weevil, or corn-beetle (which is a very noxious insect, well known to the corndealers and bakers in this country), is produced by what is called equivocal or spontaneous generation, that is to say, from inanimate substances without any parent. The principal reasons alleged in support of this opinion are, that we often find this insect in a new granary where never wheat was kept before, and therefore it is deemed a necessary conclusion that such weevils are not propagated by the ordinary course of generation. Again, it is said that we may open many grains of wheat which are sound and uninjured, so that no mark of a perforation or hole shall be discernible on the outside, yet within these grains shall be found perfectly formed and living weevils."

To this Leeuwenhoek replies that, although the granary might be new and free from the insect, yet the men who removed the corn, or the ship, waggon, or cart, employed to carry the corn might be infected with weevils by having carried grain on which they abound, and thus, from a few of those insects multitudes may be produced by the ordinary course of generation.

In order to demonstrate the truth of this, he

requested some of those who advocated the spontaneous generation theory to procure him some weevils, and accordingly, on the 13th of March, he received some grains of wheat (many of which had their insides eaten away) mixed with weevils.

The following is Leeuwenhoek's description of his experiments. "I took three glasses, in each of which I put six, eight, or nine weevils, and eight, ten, or twelve grains of wheat, which wheat I was the more assured could not be infected because it had been kept for several months closely covered up in my study. In the fourth glass I put some weevils without any wheat, but this last mode of experiment I afterwards rejected, observing that in twelve days they all died. As to the other three glasses, the weather being cold and observing the animals for the most part to be motionless, I put them into a leather case which I always carried about me. And I had no doubt but I should clearly prove to all that the weevil proceeds from a maggot, for which reason I frequently examined these objects by the microscope.

"I at first entertained an opinion that the weevil, like the silkworm moth and many other insects, did not, while in that shape, take any food; but herein I found myself mistaken, and observed that the weevil not only feeds upon wheat, but that it can excavate or scoop out the contents of every grain and creep about in the inside, being provided with a beak or trunk of a great length in proportion to the size of the body, at the extremity of which are certain exceedingly small organs or instruments like teeth, and with these it can bore or pierce through the outward husk or shell of the wheat, and thus open to itself a passage to devour the contents."

After the lapse of a fortnight he observed the impregnation of a female weevil, and in about two months his patience was rewarded by the discovery of two short and thick little maggots, one of them about the size of a large grain of sand; and on examining other grains of wheat by the aid of a microscope, he observed minute punctures, and on opening the wheat he found a perfectly-formed weevil of a yellow colour. Upon dissecting a female, he found five white eggs. He gives figures of the egg maggot "beak or trunk," and part of the head showing the compound eyes, and which he compares to "a parcel of very minute black coral beads placed in exact order close together, and this I concluded to be one of the eyes.

"I trust that these experiments and observations will prove that weevils cannot be produced otherwise than by propagation and laying eggs, from which eggs maggots proceed, and finally those maggots are changed into weevils."

He seems—to use a cant phrase—to have been "exercised" by the incredulity of the "vulgar," as will be seen from the following remarks:—"But whether the vulgar will be hereby convinced of the error of their opinion in this respect I much doubt, being continually pestered with their objections to what I have advanced. It is, however, with me a certain truth that what I have demonstrated respecting the weevil—namely, that it cannot be produced otherwise than by generation—does also hold good with regard to all creatures endued with life and motion. Probably what I here advance may appear strange to some, and they may, perhaps, wish me to inquire into the propagation of other minute animals; but for the present I leave the prosecution of these matters to those who may choose to bestow as much labour thereon as I have done in this examination of the weevil, assuring them that my observations are the result of more than four months' application to the subject."

Leeuwenhoek's microscopic studies will generally be found to have had a practical bearing. After his examination of the infected wheat and the weevil, he advises the frequent shifting of the grain, which he says will prevent the multiplication of this pest; and he gives the following reasons for this advice:—"Supposing one of these insects to have pierced and prepared two or three grains ready to deposit its eggs, and soon after the corn is moved or spread about, the animal, when it is ready to lay an egg, finding no grain prepared to receive it, must leave such egg on the outside of the corn, where the young maggot, when hatched, will be in the same situation as seed sown in barren land, and, consequently, must perish. But if such corn is undisturbed the weevil may multiply in a great degree by depositing its eggs in the grains fully prepared to receive them, and which may be considered as so many nests for the reception of the young."

Leeuwenhoek does not, however, long refrain from combating the heterogenists. His essay on the weevil is succeeded by one "On the Maggot or Caterpillar infesting Corn in granaries; the Nature of its Generation explained, and the means to prevent its increase pointed out."

"Having, as I hope, by my observations on the weevil, convinced mankind that it is propagated in the ordinary way of generation, I have since employed myself on the examination of that insect or maggot which our bakers and corn-dealers name *de wolf.*"* This creature is a very small white maggot, provided with pincers and teeth placed on the fore part of its head, by which it not only feeds on and consumes wheat and other grain, but also can perforate or gnaw holes in wood. The common opinion is that it is produced from corruption or else from what is called "blight." In order to refute this "vulgar error," he carries on a series of experiments similar to those described in the essay on the weevil; and he found that the maggot

* "The Wolf." From a note it appears that this pest was scarcely known in England.

developed into a small moth, which, he says, "are very pretty objects to behold; the wings, which are four in number, being white, sprinkled all over with black spots; and on examining them with the microscope I found that this whiteness proceeded from the white feathers on the wings, and that the black spots were caused by other feathers which were black on the edges. Although I examined some thousands of these feathers, they were all so differently formed that I cannot say I saw two exactly alike. All of them, although so very minute, have quills like the feathers of birds, by which they are fixed or rooted in the membrane that forms the wing, and so completely cover it that it cannot be seen."

Here Leuweenhoek's microscope played him false or his imagination misled him, for as we now know, the butterfly or moth scales exhibit a totally different structure to the feathers of birds. The figures of these scales represent them as having a quill to which barbs are attached precisely as they occur in the feathers of humming-birds.

The great Dutchman concludes this essay with the following remarks:—"Can any man in his sober senses imagine that this moth, of which I have given the description, which is fitly provided by nature with the means to propagate its species, furnished with eyes exquisitely formed, with horns, with tufts of feathers on its head, with wings covered with such multitudes of feathers all of different shapes, and these exactly covering the wings in every part—can this moth, I say, adorned with so many beauties, be produced from corruption? For, in a word, in this little creature, contemptible as it seems to us, there shines forth so much perfection and skill in the formation as to exceed what we observe in larger animals."

(*To be continued.*)

THE ORIGIN OF THE GREENSAND.

"* * * Now as it is not a fact that greensands of the Cretaceous epoch are always composed of foraminiferal casts, it is time that the statement of Ehrenberg, endorsed so unreservedly by Carpenter, should be challenged."—*S. A. Stewart, in* SCIENCE-GOSSIP *for Nov.*, 1875, *p.* 243.

THE author of the note on "Greensand and its Origin," from which the above sentence is extracted, severely censures Dr. Carpenter for accepting the statement that the greensand grains, so constantly met with at the base of the Upper Cretaceous series, are for the most part internal casts of Foraminiuifera in glauconite.

Now I have no doubt that Dr. Carpenter can very well defend himself, and can give, as indeed he has elsewhere given, very excellent reasons for so unreservedly endorsing Ehrenberg's observation; but as he may not think it worth his while to notice the errors and assumptions visible in Mr. Stewart's paper, I beg leave to offer a few observations on the subject; for as *it is* a fact that some greensands do mainly consist of foraminiferal casts, the general denial thereof by Mr. Stewart should not pass unchallenged.

In the first place I think Mr. Stewart has been misled by the expression used by Dr. Carpenter in the particular paper he quotes, viz., "*the* greensand deposit of the Cretaceous epoch." It is indeed rather a loose statement, since greensand beds occur at many horizons in the series, not at one only, as this might be understood to mean; but any one who has read Dr. Carpenter's other papers on the subject would know that he is, of course, fully aware of this well-known fact.

If Mr. Stewart's argument were that all greensands have not yet been proved to have a foraminiferal origin, and consequently that we should be cautious in taking for granted that they have all been formed in the same way, there would be some reason in it; but no such discretion is to be found in his communication; on the contrary, he denies the fact *in toto*, and says: "The assumption that the greensand is formed of casts of Foraminifera should be rejected for the following reasons:—

"1st. Foraminiferal shells do occur plentifully and uninjured in the English greensand; ergo, there is no cause for assuming the wholesale destruction of calcareous shells in that epoch.

"2nd. Calcareous tests of mollusca have remained; casts are rare in the greensand.

"3rd and conclusive. The grains of glauconite in the Irish greensand, when examined with the microscope, show no real resemblance to Foraminifera."

My first criticism on these objections is that, supposing the statements they contain to be true, they are apparently all founded on the assumption that if certain fossil organisms do not exist in one locality, *therefore* they cannot exist in any other locality; and I submit that such logic is hardly defensible.

With regard to the first of these arguments, Mr. Stewart is quite correct in stating the existence of calcareous shells in the Cambridge greensand, but he has apparently overlooked the published fact that glauconitic casts of the same also occur in great abundance. For this I may refer him to papers by Mr. W. J. Sollas, in the *Quart. Journ. Geol. Soc.*, xxviii. p. 397, and in the *Geol. Mag.*, vol. x. From the former I extract the following remarks as being both explanatory and conclusive.

"From the resemblance of most of the green grains to the Foraminifera found with them, from their rough parallelism in size, from the appearance of many of the grains when sections are made of them, and from the occurrence of glauconite casts in the interior of the original Foraminifera, we must attribute to the green grains a foraminiferal

origin. That this has not been determined by previous observers is partly due to the use of acid, after Ehrenberg's directions, in preparing the sand; this of course would obliterate the calcareous lines which distinguish the lobations. The silica and various silicates mingled with the glauconite grains must have thrown the analysis of these grains hopelessly wrong."

Taking now Mr. Stewart's second objection, that the calcareous tests of mollusca have remained, and that casts are rare in the greensand,—according to the context this should refer to the English greensand, and such a statement sounds somewhat strange to any one acquainted with the fauna of the Cambridge bed, the greater part of which, or some two hundred species, are only found in the state of phosphatic casts; it is true I regard these as derived by erosion from the gault; the fact nevertheless remains that they are now in the greensand or chloritic marl, which here forms the basement bed of the chalk.

Again, take the chloritic marl of the Isle of Wight. Here casts are common, some fossils, such as the Ammonites, rarely retaining their calcareous tests, while those shells that do remain, such as those of the Lamellibranch Molluscs, have always lost their internal nacreous layer, so that any traces of the hinge or internal muscular impressions are rarely visible. This is indeed the ordinary state of shells in many glauconitic and all chalk strata, and I regard it as a very significant fact, which may possibly find its explanation in that very presence of carbonic acid in excess at great depths, which Dr. Carpenter and others have suggested to account for the removal of the foraminiferal shells on the sea-bottom.

The third reason (which Mr. Stewart regards as conclusive!) simply amounts to the fact that the Irish glauconite grains, though carefully examined by himself and Mr. Wright, show no resemblance to Foraminifera. This may be so, and it is of course worth ascertaining; possibly, however, acid has been used in these examinations, which, as Mr. Sollas has pointed out, increases the difficulty of recognizing their true origin. And even supposing that these Irish greensands are not composed of foraminiferal casts, I fail to see how that is a conclusive objection to their forming the main constituent of other greensands.

It is not necessary for Dr. Carpenter's argument that all greensands should be so constituted; it i sufficient for him that such should frequently be the case; and of this there can, I think, be little doubt, if Mr. Stewart will accept the statements of other authorities in the scientific world.

Besides the testimony of Professor Ehrenberg and Mr. Sollas regarding greensands, Professor Bailey, of the United States, was the first to ascertain that the process was going on at the present time in the Gulf of Mexico. Dr. Carpenter has also obtained such casts both from dredgings in the Ægean and from Mr. Jukes's Australian dredgings (see a paper in *Proc. Roy. Soc.*, 1875, p. 242). Lastly, I may quote from a paper read before the Geological Association last year (p. 24): "The observations recently made in the 'Challenger' show that all along the line of the Agulhas current there is a greensand covering the bottom. Now, as Professor W. Thomson says, we should simply have noted this as greensand if we had not had in our mind the observations of Professor Ehrenberg. Looking at this greensand with a microscope, we are able at once to recognize the grains as almost entirely the internal casts of Foraminifera."

With regard to the question raised by Dr. Carpenter as to whether the absence of the shells is attributable to mechanical abrasion or chemical solution, I am inclined to think that sometimes one cause, sometimes the other, has been in operation. In the Cambridge greensand it is, I think, chiefly due to abrasion, the co-existence of shells and casts in that bed being thus accounted for. Supposing them both to have been contemporaneous with its deposition, it is difficult to see why some should be in the state of casts, and others retain their shells in a perfect and uninjured state; but on the hypothesis that the latter only belong, so to speak, to the indigenous fauna, while the former have been derived from the Upper Gault, their association in so thin a bed receives a perfectly natural explanation.

It would, perhaps, have been more prudent in Mr. Stewart to have asked for information on the subject, rather than to have given an unqualified denial to observations which are made by competent men, and he is especially unfortunate in remarking that "hasty generalizations are the greatest fault of our times, and it is to be deprecated that erroneous statements should go forth under the sanction of high authorities in the scientific world." I most cordially agree with this sentiment, and the present communication has sprung from a similar wish, viz., that erroneous statements and hasty generalizations should not be put forward by any one professing to be a scientific man.

Cambridge. A. J. Jukes Browne.

"It has often been vaguely asserted that plants are distinguished from animals by not having the same power of movement. It should rather be said that plants acquire and display this power only when it is of some advantage to them; this being of comparatively rare occurrence, as they are affixed to the ground, and food is brought to them by the air and rain. We see how high in the scale of organization a plant may rise, when we look at one of the more perfect tendril-bearers."—*Darwin on the "Movement and Habit of Climbing Plants."*

THE SNAPPING TURTLE.

(*Chelydra serpentina.*)

FROM my study window I have an unbroken view of a broad expanse of meadow, dotted here and there by single huge hickories, a willow hedge, and margined beyond by the broad expanse of the Delaware river. Of various levels, some of the lower tracts are always wet, and for many weeks of each year wholly submerged. While I now write (Oct.) such is the case; and the few acres of meadow, now a shallow pond, that glistens and gleams like gold while bathed in the mellow light of the setting sun, attracts by its beauty troops of noisy herons, that eagerly pursue the great bull-frog (*Rana pipiens*); and that, too, has a charm for timid wood-ducks (*Aix sponsa*) that cut the still waters as they speed along and vie with the sunset in their brilliancy of colour. All that is now in view seems full of active life, and brilliant with a wasteful wealth of colour. What of beneath the waters?

As I watch the surface of the pond, I see ever and anon a small black dot, as it were, upon the surface, moving quite irregularly about. Forward, sidewise, backward, and then disappearing, only to reappear, and again as restlessly to move about. Small as the dot is, as seen from my window, it is given a wide berth in its peregrinations; for the ducks swim rapidly off if it approaches them, and it is no tempting morsel to the herons, for they pass it by however near it may come. This black dot is, in reality, the pointed snout of the "snapper"—our fiercest and largest turtle—the *Chelydra serpentina* of naturalists.

Zoologically considered, this turtle has a most interesting history, being much more active and intelligent (?) than the four species found associated with it here in New Jersey.* For an idea of its general appearance, I refer the reader to the illustration, calling attention particularly to the neck, which is capable of being extended to a considerable length, and with so sudden a movement, that the animal gives one the idea of a serpent concealed in a shell rather than of a turtle. A specimen kept for several months in an aquarium, I noticed always withdrew its head when it noticed a fish approaching, and at the same time slowly elevated its whole body by its fore feet; then, if the fish came near enough, the neck was suddenly (literally, as quick as lightning) lengthened, and the object seized. Once the powerful jaws are closed upon the victim, nothing can force the turtle to relax his hold.

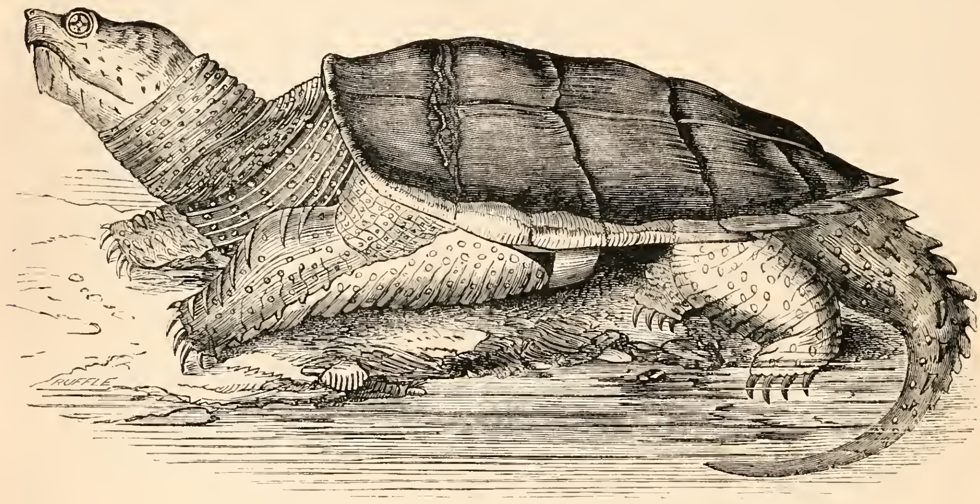

Fig 12. Snapping Turtle (*Chelydra serpentina*).

Even decapitation will not avail for some time. Absurd as it may seem, it nevertheless is true that the head of this turtle, after decapitation, will retain sufficient vitality (?) to maintain a firm hold upon the object seized for several hours. And judging from the eyes, which remain open and bright, this severed head is conscious up to the last. My own

* In central New Jersey, there are four species of water turtles, two of which are exceedingly abundant; and all four, far more than the snapper, love to bask in the sun, during summer and early autumn. These four species are the "Stinking Turtle" (*Ozotheca odorata*); the Painted Turtle (*Chrysemys picta*); the Spotted Turtle (*Nanemys guttata*), and the Red-bellied Turtle (*Calemys Muhlenbergii*). The first and third mentioned are the most numerous, inhabiting every pond that contains fish, their principal food. The Painted Turtle and "Red-belly" are now less common than formerly, both being sought after by restaurant keepers, who palm them off on their customers as "Terrapin" (*Malacoclemys palustris*), but no cookery, however skilful, can deceive those who are accustomed to the "genuine article."

experiments indicate *apparent* life in the head, if not *actual*, for from six to twenty hours, according to the size of the animal; the older specimens living longer than younger ones.

When on land, the snapper seems to be quite at home, although his movements are very awkward. But considering that it can travel "on foot" quite expeditiously, the manner of walking is really less awkward than it appears. "He moves along with head and neck stretched out, moving them to and fro, as he proceeds, as though inspecting the ground as he goes. His walk is said to resemble that of our alligator; like them falling now and then on his sternum to rest, and then proceeding." (Holbrook.)

In New Jersey, the snappers leave the water about the middle of May to lay their eggs. I have found them from twenty to two hundred yards from water, making quite deep holes in sand or loose earth, and laying therein their whole complement of eggs. When fairly free from the egg, they find their way to the water quite soon, I judge, as I have found very small specimens paddling about in shallow water, snapping at minute insects as voraciously as their parents seize fish. According to Prof. Agassiz, this snapping habit commences wonderfully soon. In his "Contrib. Nat. Hist. of U.S.," vol. i. p. 175, he says: "The Snapping Turtle, for instance, exhibits . . . . its ferocious habits even before it leaves the egg, before it breathes through lungs, before its derm is ossified to form a bony shield, &c.; nay, it snaps with its gaping jaws at anything brought near, though it be still surrounded by its amnios and allantois, and its yolk still exceeds in bulk its whole body." And again:—"I have seen it snapping in the same fierce manner as it does when full grown, at a time it was a pale, almost colourless embryo, wrapped up in its fœtal envelopes . . . . three months before hatching."

Judging from the fact, that the younger they are, the more incessantly they are pursuing and devouring small animals of every kind, fish, shells, insects, —everything, in fact, that comes in their way,— judging from this, I believe the growth of the young is very rapid until they attain a length of six or seven inches. After this I have no means of ascertaining the rate of growth. It must be remembered, however, that, like our black snake (*Bascanion constrictor*), the maximum growth has never yet been determined. The largest snapper I have met with weighed nineteen pounds; they have been captured weighing nearly or quite fifty. That they are long-lived is well known, and probably growth slowly continues throughout the whole period of their existence.

As already stated, the snapper is voracious beyond description, but I believe not, as generally supposed, strictly carnivorous. They seem fond at times of the stems of water-lilies, and eat quite a large quantity at one time. I presume they devour them as food, and not, as a cat eats grass, as a medicine.

In studying the movements and feeding habits of a specimen confined in an aquarium, I noticed that this turtle has quite a peculiar voice, but only gives utterance to his peculiar cry at night. It is best described as a bellow, faintly heard, as though uttered a long distance off. After making innumerable attempts, in various ways, I finally succeeded in *seeing* the turtle when uttering this peculiar cry. The animal stood up on all four feet, stretched its neck out as far as possible, and, with its head wholly out of water, gave utterance to the cry or "call" with the mouth widely open. The turtle then sank to the bottom of the aquarium, and did not repeat the cry that evening. This sound, I suppose, is, in fact, a "call" note, under ordinary circumstances, to be heard only during the breeding season; being uttered only by the males to attract the other sex. I am quite positive, however, that I have never heard the same sound in the haunts of this turtle.

As is common with turtles, the world over, this species is far more active at night than during the day, but is "sleepy" at no time of day or year. Even after the creeks are tightly frozen up, and the snapper is snugly fixed in his winter quarters in the mud, he is then, even, quite wide awake if any intruder appears, and will bite as savagely when you draw him from the frozen mud in January, as he seizes an unsuspecting duckling by the leg in summer, to make a meal of in some quiet resting-place at the bottom of the pond.

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NOTES ON PLEOMORPHISM.

BY P. DUFFY, F.L.S., F.C.S.

(*Continued.*)

THE question—What is the purpose in nature of this capacity of pleomorphism possessed by certain fats? is not one that lies directly in the line of the present discussion; but looking to the almost universal diffusion of such substances in living bodies, it assumes such an interest as will, I think, justify me in referring, however briefly, to one fact that I have ascertained, and which very likely indicates an important function of such glycerine fats in the economy of living animals and plants. If one of these fats be fused at the highest of its three melting-points, it takes up a quantity of heat that remains latent—if the fat be not agitated— even when the temperature falls and the fat solidifies below all three melting-points; but if, in the process of cooling, the fat be agitated, it solidifies several degrees above its lowest melting-point, and con-

sequently in the second modification, while at the same time the heat previously latent is evolved in sufficient quantity to raise the temperature of the mass 8° or 9°.

Are we to infer from this that, besides the other ways in which fats regulate the temperature of the organisms in which they occur, nature, by endowing them with the capacity of pleomorphism, has invested them with an additional and special power of compensating sudden vicissitudes of temperature?

I shall not trouble you with more than one other illustration of pleomorphism as manifested by non-living matter. In a late number of the "Proceedings of the Royal Society," it is shown, in a paper by Mr. Rodwell, that the iodide of silver exists in three allotropic forms: viz., (α) at temperatures between 241° and its fusing-point, which is about 842°, as a plastic, tenacious, amorphous substance, possessing a reddish colour, and transparent to light; (β) at temperatures below 241°, as a brittle, opaque, greenish-grey crystalline mass; and (γ), if fused and poured into cold water, as an amorphous, very brittle, yellow, opaque substance.

But the most remarkable and anomalous character of this body is, that, in cooling after being melted, the following effects may be observed:—(α) At the moment of solidification a very considerable contraction takes place; (β) the solid, on further cooling, undergoes slight and regular contraction, after the manner of solid bodies in general, until (γ) at or about 241° it undergoes sudden and violent expansion, passing from the amorphous into the crystalline condition; (δ) after undergoing this expansion, the mass, on further cooling, undergoes slight expansion, and (ϵ) the co-efficient of contraction diminishes as the temperature decreases (or, otherwise expressed, the co-efficient of contraction augments with the temperature).

Hitherto I have spoken of dead matter only, and of the changes of which it is susceptible without losing its identity. But in the world of life we meet with phenomena which, although I confess, it is on any view of their nature difficult to compare them with those I have been speaking of, yet suggest so many analogies with the latter, that I cannot help speaking of some few of them in this connection.

The case of the metamorphoses of insects is one so familiar to most persons, that I need do no more than refer to it.

My next illustration is from a homely source. We are all familiar with an unwelcome guest, which, in the form of a white down, takes up his quarters upon the surface of jams and preserved fruits that have begun to decompose. This white down consists of a fungus known as the *Aspergillus glaucus*, which, after its spores have ripened, assumes a grey or dull-green colour. The vegetative portions of this fungus—that is to say, all that part of it which is not immediately concerned with the production of the fruit,—the mycelium, as it is called—consists of a series of interlacing and branching cylindrical threads made up of elongated cells placed end to end, and generally filled, at least in the young state, with a liquid in which very fine granules appear to be suspended, and to which the name protoplasm is given. These threads keep constantly elongating by additions to their points, and give off branches in all directions, which again elongate in a similar way. Some of these threads overspread the surface, others ramify in every direction through the substance of the matter upon which they grow. From the superficial threads certain branches rise perpendicularly into the air to the length of about $\frac{1}{50}$th of an inch, and these branches bear at their summits little globular heads. From the upper half of each of these heads issues a series of small, closely-packed processes, at the free extremity of each of which a small round protuberance is formed, which eventually becomes a spore. No sooner is one spore formed than the formation of a second commences on the same spot, pushing forward the one first formed, and to this succeeds another, and then still another, until some ten or more have been produced on each of the processes—*sterigmata*, as they are called,—the whole series remaining connected for a time, and forming a chain of spores extending in the direction of the axis of the sterigma. These spores, each of which is about $\frac{1}{2500}$th of an inch in diameter, are distinguished by the name *conidia*: it is they which, when in mass, constitute the fine dust of a grey-green colour already mentioned.

I have been thus minute in describing the peculiarities of the conidiiferous form of fructification of *Aspergillus glaucus*, because they are more or less typical of what we meet with in the case of many other fungi.

But what I wish to direct attention to more particularly is, that the same mycelium which produces this kind of fruit, these conidia, also gives rise to another set of reproductive organs. When the production of conidia is drawing to a close, a number of small fine branches issue from the mycelium. After attaining a short length, each of these assumes the form of four or six turns of a corkscrew. Eventually, these turns approach each other till they form a hollow screw; a small branch now issues from the base of the spiral, and extends till its free extremity meets that of the spiral, with which it then unites. This union is held to be the equivalent of impregnation among the higher plants. Other branches then issue in all directions, interlacing with one another, till they form a close hull over the spiral; the whole presenting the appearance of a little yellow spherule. Each of these yellow spherules when mature contains a number of bags, each bag (*ascus*) containing eight spores,

which equally with the other spores, *conidia*, reproduce the parent plant when placed in suitable circumstances.

These two kinds of spores were formerly considered to belong to two different species of fungi, *Aspergillus glaucus* and *Eurotium herbariorum;* they are now known to be the product of one and the same species, which is called *Eurotium Aspergillus glaucus.*

Many instances of pleomorphism connected with cryptogamous vegetation might be given, differing from this only in certain details, which, although very important, are too minute to be entered upon here; but I must not refer at present to more than one other, which has been brought to light of late years by the researches of De Bary, and one which, looking to the fact that it sweeps away all barriers that were supposed to divide the animal from the vegetable kingdom, is so startling in its consequences, that if it rested upon any less authority than that of De Bary, would be supposed to be a mistake of observation. When the spores of certain fungoidal organisms, which De Bary calls *Myxomycetes,* are placed in circumstances favourable to their germination, they burst, and the protoplasm with which they are filled slowly escapes. At first the escaped protoplasm has a globular shape, but presently its circumference begins to undulate, throwing out and withdrawing pointed processes, till it soon assumes the shape of an elongated body endowed with motion, and which is provided with a vibratile cilium on the end, that points in the direction of its motion. Towards the hinder end are to be seen one to three vacuoli, one of which, at least, is contractile, that is, it expands, and again contracts to almost total disappearance. Suspended in water, these bodies exhibit all manner of contractions and extensions of their own substance, while at the same time they exhibit two kinds of motion, one of rotation, the other of progression. At this stage they are not inclosed in any distinct envelope, and, in short, they exhibit every character by which the organisms of the admittedly animal family *Amœbæ* are distinguished, so that there is no good ground for denying that at this period of their life they are as much animals as amœbæ are.

The most remarkable cases of pleomorphism of which I know anything have, however, been brought to light chiefly by the investigations of Mr. Darwin upon certain flowering plants, which he calls *dimorphic* and *trimorphic.* In his own words,* "Dimorphic species consist of two forms, which naturally exist in about equal numbers; in the long-styled form, the pistil is always longer, and the stamens (excepting in the case of *Linum grandiflorum*) are shorter, than in the other form. Conversely, in the short-styled form the pistil is shorter and the stamens longer, than in the long-styled form. In the latter the pollen-grains are almost always of larger size than in the short-styled form. The sexual union of the two distinct forms is necessary for full fertility. . . When long-styled or short-styled plants are impregnated with their own-form pollen, the union is not fully fertile, or is even absolutely barren. Such unions, and the offspring raised from them, may be called illegitimate. Thus, two legitimate and two illegitimate unions can be effected.

"With Trimorphic species the case is more complex. There are three forms which differ greatly in the length of the pistil; and in each form two sets of stamens exist, differing in length, in the size of the pollen-grains, and often in colour. The stamens are graduated in length, so that one of the two sets in two of the forms is equal in length to the pistil in the third form. For instance, in the long-styled form the pistil equals in length the longer set of stamens in the mid-styled and short-styled forms. In all three forms the union is fully fertile and legitimate only when the pistil is impregnated with pollen from the stamens which equal it in length. Thus the long-styled form can be legitimately fertilized only by the longer stamens of the mid-styled or short-styled form; it can be illegitimately fertilized by its own two sets of stamens, and by the shorter stamens of both the mid-styled and short-styled forms, so that the long-styled form can be fertilized legitimately in two ways, and illegitimately in four ways. The same holds good with the mid-styled and short-styled forms; hence, with trimorphic species eighteen unions are possible, of which six are legitimate, and produce legitimate offspring, and twelve are illegitimate, and produce illegitimate offspring."

It is unnecessary here to multiply instances of the analogy which I suggest exists between the behaviour of living matter and that of non-living matter in respect to pleomorphism, the variability of bodies without loss of identity, for to each of us will occur other illustrations furnished by chemistry or by biology, according to our familiarity with one or other of these sciences.

* *Journal of Linn. Soc.*, Botany, vol. x. p. 393.

REMARKS ON THE *ACTINOPHRYS EICHHORNII.*

THE May number of SCIENCE-GOSSIP, 1875 contains some observations on *Actinophrys Sol,* which I intended to follow up with some further remarks on its economy. But so complicated and numerous were the changes through which they pass in the course of their life, that at present it is impossible to detail or follow out in a satisfactory manner their life-history. The following observations are upon the economy of *Actinophrys Eichhornii*

the study of which has been most interesting. I have been enabled to follow them through the entire circle of their life, and I trust, with the aid of the accompanying sketches, to render the same plain and interesting to the readers of SCIENCE-GOSSIP.

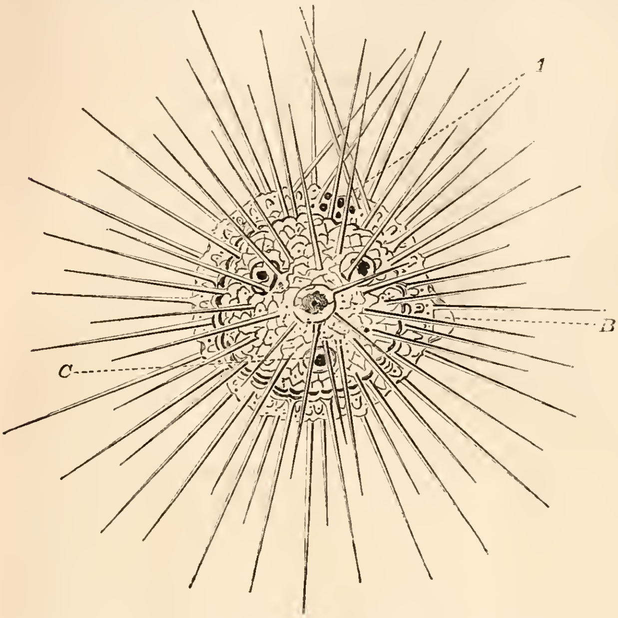

Fig. 13. *Actinophrys Eichhornii; A*, food at the edge of body and spines crossed; *B*, contractile vesicles; *C*, vacuoles containing food and digestive matter.

Actinophrys Eichhornii differs very materially from *A. Sol*. It is generally much larger when full-grown, of a whiter colour, and more translucent.

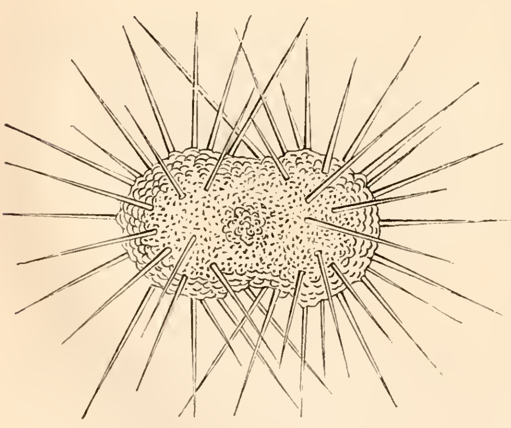

Fig. 14. *A. Eichhornii* (conjugation).

Its spines are more numerous, more flexible, and of greater length; some of them are more than twice the diameter of the body. In the beginning of last May I had six of the *A. Eichhornii* in a glass cell, and they increased by fission to over thirty in number by the end of June. On the 23rd of July I observed some of them were withdrawing their spines. Having seen the same thing performed by the *A. Sol*, and knowing that this

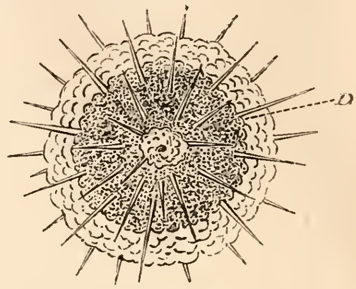

Fig. 15. Spines partly withdrawn; *D*, irregular inner circle.

indicated a change about to take place, I became much interested in them, and was very desirous of witnessing what these changes would lead to, being persuaded that they had to do with the preservation and propagation of their species; and, as the reproduction of these animals is very imperfectly known, and little understood, any light thrown on the subject must be of interest. I had seen what is termed "conjugation" take place several times. The process is this: two *Actinophryes* approach each other; their spines first meet and cross each other; but soon the

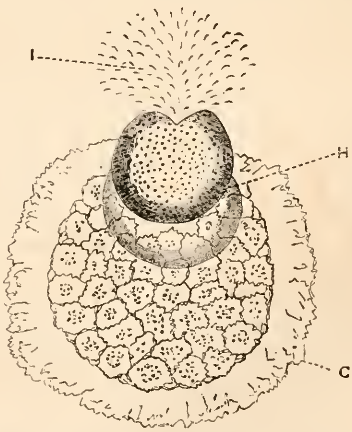

Fig. 16. The transparent state: *G*, the pellucid mantle; *H*, capsules or ves cle; *I*, spermatozoa escaping from the capsule.

surfaces of the two bodies touch, and they slowly become fused into one mass, first of an oblong form (fig. 14), and finally into one large round *Actinophrys*

(fig. 13). This act of conjugation which I witnessed began at six o'clock in the morning; at ten o'clock it had proceeded to the state and form of fig. 14; at seven in the evening they had become as one, with no difference in their appearance from the ordinary

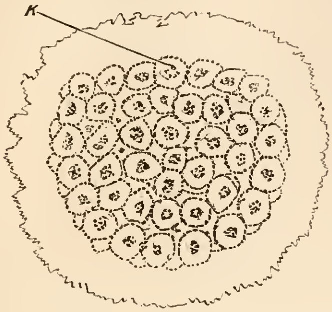

Fig. 17. *K*, the flattened or indented body, after the escape of spermatozoa.

single ones, with the exception of its being a trifle larger, and the two contractile vesicles being still in full action. This *Actinophrys* I watched in particular

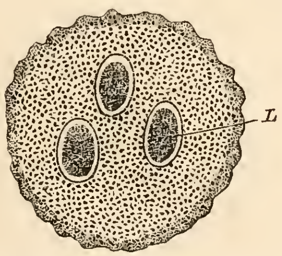

Fig. 18. The granular appearance after change from figs. 15 and 16; *L*, the formation of ovules.

when the spines had begun to shorten, and on July 23 the spines were nearly withdrawn (fig. 15); the inner circle of which at *D*, and fig. 23, *E*, now

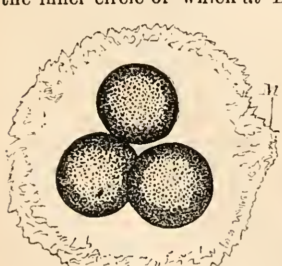

Fig. 19. The eggs perfectly formed; *M*, the very transparent envelope.

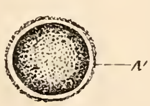

Fig. 20. Egg clear of the envelope: *N*, the marginal lines caused by the contraction of the contents.

became very irregular and confused. In about four hours the spines were entirely withdrawn (fig. 23), and the whole was of a dark colour, and appeared to consist of a granular mass. At this stage the edge is seen gently and slowly to undulate (fig. 23, *E*); these pulsations at first I thought to proceed from the action of the contractile vesicles, but on seeing them on different parts of the margin at the same time, and their not rising so high or so regular as the vesicles generally do, convinced me that the motion was the effect of some other cause. From

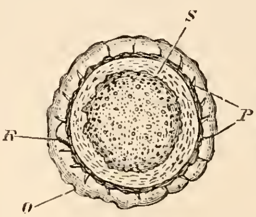

Fig. 21. Showing the expansion of the original circle; *S*, the marginal line widened; *O*, the delicate mantle; *P*, the spines bent; *R*, contractile vesicle.

Fig. 22. The further advance of spines and mantle.

this state in about four hours the whole globe became transparent (fig. 16), having the resemblance of a piece of lace with rounded patterns worked upon it,

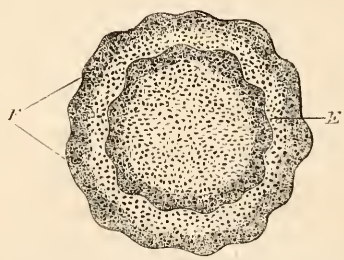

Fig. 23. Spines entirely withdrawn; *E*, the irregular inner circle; *F*, the undulating surface.

the centre of each having a darker spot, the whole surrounded by a pellucid mantle (fig. 16, *G*). At this time it was still globular in form, but very soon a

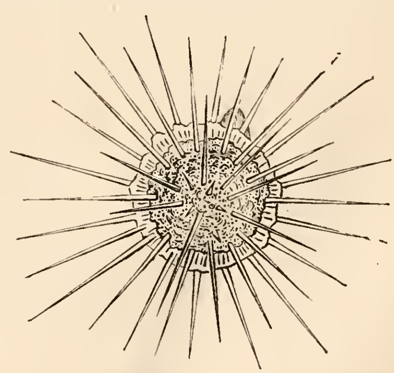

Fig. 24. The perfected *A. Eichhornii*.

capsule or vesicle was seen swelling up from it (fig. 16, *H*), perfectly clear and transparent, in which could be seen innumerable minute moving bodies, exactly in the same manner as those seen in the

sperm-cells of the Hydra,* and also, like them, this capsule opened and discharged therefrom a vast number of those bodies into the surrounding water (fig. 16, *I*). Their movements in the water, and their apparent size, were very similar to those of the Hydra.† After the rupture of the capsule, and discharge of the spermatozoa, that portion of the globe became flattened or indented (fig. 17, *K*), over and around which were seen the escaped spermatozoa,‡ that continued to float round the now transparent globe, which soon again resumed the perfect round form, and gradually the whole became quite opaque and of a uniform granular appearance (fig. 18). Soon there were some darker spots discernible within, which gradually enlarged and became thicker; and in about twenty-four hours these spots assumed an oval form (fig. 18, *L*), each surrounded by a lighter margin. These ovules vary in number from two to six in different individuals, and continue to darken in colour, and change in form, until they become perfectly globular (fig. 19). At the same time the dark part which had surrounded them now entirely disappears, and they were enclosed in a perfectly transparent envelope. So transparent was it, that at first it could be discerned only when a particular ray of light was thrown upon it, when from its own reflection it became visible; but, in consequence of its gelatinous nature, it was soon detected through the many extraneous substances that came in contact with and adhered to it; such as decaying vegetable matter, algæ, various Desmids, &c., with which, long before their development, the eggs became almost hidden from view. By this envelope the eggs were evidently fixed in one place on the glass; in this state they continued for more than two months, manifesting outwardly no perceptible change. They were quite opaque, and had a fine granular appearance. By Aug. 14 the envelope had become of a darker colour, and was evidently decaying away, and the eggs in some of them had moved nearer the edge, and were observed slowly to change their position. Aug. 29th two of the eggs were clear of the envelope, so that the changes that took place were distinctly seen (fig. 20). At the end of about ten weeks from the time that the eggs were fully formed, a contraction of the contents took place, and a narrow line became visible within the circle at the edge, which gradually became broader and somewhat irregular as the contraction went on, until they had the appearance shown at fig. 20. At this stage very slow movements were seen in the granular contents of the eggs. Up to this time no change had taken place in the size of the eggs. On Sept. 11th, I observed that the original circle of the egg was gradually expanding, leaving a wider margin (fig. 21, *S*). This was at twelve o'clock at noon; there were then no spines visible; but in ten minutes from this time a very delicate mantle, or envelope, was gradually thrown out with an undulating motion round the egg (fig. 21, *O*). In another ten minutes the envelope was further expanded, and then could be discerned very fine spines arising from the now expanding outer circle, but still within the delicate and newly-formed envelope. The spines were in a somewhat bent position at first, as though the envelope had not extended far enough to allow them to push out quite straight (fig. 21, *P*). The contractile vesicle, so very characteristic of these animals, was now for the first time seen in full action at this early stage of development (fig. 21, *R*). The expansion of the pellucid envelope continued to go on as the spines increased in length. At the expiration of another ten minutes they presented the form of fig. 22, the undulating envelope still extending, and the spines now pushed out very fast, both in number and length, when the envelope suddenly collapsed and disappeared altogether, and the spines rapidly acquired their proper form and full length. In about forty minutes from the commencement of the enlarging of the original circle of the egg, the *Actinophrys* was rendered perfect (fig. 24), exactly like the original, but much smaller. In about three or four days they increased to the full size, when they measured about $\frac{1}{55}$th of an inch in diameter; the egg measured about $\frac{1}{250}$th of an inch in diameter.

One of the young, the development of which I had followed from the enlargement of the egg to its perfect form, came in contact with the extended spines of a large one, was speedily drawn to the surface, and incepted like other particles of food. The little fellow was soon dissolved, and lost sight of. This did not look like the process of conjugation, but rather more like cannibalism. At the same time in the old one there were three vacuoles containing food (fig. 13, *C*). Small particles taken as food glide slowly down the tentacles; when the surface is reached it becomes indented, and the spines cross each other (fig. 13, *A*). As the food proceeds towards the centre of the body, it becomes inclosed in separate vacuoles, undergoing the process of digestion; the indented edge again resumes its usual form, and the spines again become straight.

At times there are to be seen, confined to certain localities in the *A. Eichhornii*, granules in constant motion, very similar to those always found in the points of *Closterium lunula*, styled circulation; but these are not to be confounded with the spermatozoa seen in the capsule, as the granules are much larger,

* See SCIENCE-GOSSIP, 1874, p. 158, and 1873, pp. 12, 13.

† Those of the Hydra Professor Gulliver examined under a high power, and proved them to be spermatozoa, estimating the mean length of each spermatozoon at about $\frac{1}{6400}$ of an inch; and could I have procured those thrown out of *A. Eichhornii*, no doubt but he would have been able to prove them of the same nature.

‡ I call it spermatozoa, believing it to be so.

and are confined in various places, and do not escape from the body.

Thus I have traced *A. Eichhornii* through the circle of its life-history, which has occupied five months. It appears that the more general way of its multiplication is by fission or self-division, and that this mode of reproduction (which I have endeavoured to follow out and explain in this paper) is something similar or analogous to the *Ephippia* or winter eggs of the *Daphnea*, the egg of the Hydra, or the statoblast of *Lophopus crystallina*, *Plumatella repens*, and other polyzoa, which are intended for a purpose to lay for some time before they are developed into life.

This paper is an abstract of a more extended communication, illustrated by diagrams, read at a meeting of the East Kent Natural History Society at Canterbury, Oct. 6th, 1875.

Canterbury. JAMES FULLAGAR.

LOCAL NAMES OF PLANTS.

IN the interesting paper on the "Local Names of Plants" in the December number of SCIENCE-GOSSIP, "C. B." mentions having seen "Reckless" used in Covent Garden Market as a corruption of auricula. It may interest your correspondent and others to know that Reckless is the common name for the auricula in several localities on the eastern borders. "Dusty miller" is another name frequently used in the same district for the "mealy-" leaved varieties.

The following names are used in the neighbourhood to designate some of the common wild plants:—*Ranunculus fluitans*, *R. aquatilis*, and several pond weeds are known as "eel-beds." The various scarlet poppies are "cocks'-kames" (combs); *Raphanus raphanistrum* is the "runch" of the farmer, although both the white mustard and the charlock are sometimes so called. The different species of Malva are "maws." *Ononis arvensis* is called "liquor-stick," from its taste somewhat resembling that of liquorice (*Glycyrrhiza glabra*). According to Johnston's "Eastern Borders," p. 70, quoting from Thomas Aird, brambles are called "ladies' garters" in Roxburghshire. I have never heard that name applied to any of the *Rubi* in the part of Roxburgh that I am acquainted with, but frequently to the variegated variety of *Digraphis arundinacea*. About Bowden, the poet's birthplace, it may be one of the local names. "Ar-nut," or "er-nut," is a corruption of "earth-nut" (*Bunium flexuosum*). *Sedum telephium* is the "orpy-leaf," and *Sempervivum tectorum* is called "Fu-its" (both are popular remedies for cuts, &c.). The latter will soon be a thing of the past in this district, as it is fast disappearing, along with the thatched cottages, on the roofs of which it was generally seen. *Saxifraga umbrosa* is changed from "None-so-pretty" to "Pretty Nancy," and the hemlock becomes "humly." "Robin-rin-the-hedge" is a very characteristic name for *Galium aparine*. "Dishy-lagy," the common name for *Tussilago farfara*, is evidently a corruption of the generic name. "Feather-fooly," the local name of fever-few, has probably been given to it on account of its featherlike foliage. *Veronica hederifolia* is named by farmers the "mother-of-wheat"; and *Galeopsis versicolor* and *G. tetrahit*, are "day" or "dey-nettles." *Polygonum aviculare*, owing to its toughness, has earned the name of "deil's lingels"; and on account of its acid taste, *Rumex acetosa* gets "sour leeks," "little guid." *Euphorbia helioscopia* is used for removing warts. The tremulous-leaved poplars are honoured by the appellation of "auld-wives'-tongues," possibly from their constant motion. But why auld (old) wives? Many young ones have the same gift. "Silver-shakers" and "silver-ginglers," are children's names for the elegant *Briza media*. Frequently different species of the same family get a common name, e.g., *Fumaria Boræi*, *F. densiflora*, and *F. officinalis*, are all "fumitory," or, as an old man whom I knew used to call them, "Flumistery." Likewise "bull-grass" may be either or all of the following: *Bromus mollis*, *B. racemosus*, or *B. commutatus*.

A. B., *Kelso.*

MICROSCOPY.

GLYCERINE MOUNTING.—As an addition to the subject of glycerine mountings, and the best cement for preserving them for some time past noticed in SCIENCE-GOSSIP, it may be that my experience with the same may not prove uninteresting to your readers. I have used this medium for many years in the mounting of vegetable and insect preparations, and have very rarely lost a slide from leakage. I have used every description of cement with which I am acquainted that could be employed with such a medium, and have found the white zinc cement, when properly prepared, to be by all odds the most satisfactory, on account of the facility with which it can be used, and its permanence. I usually keep a supply of cells ready made, with one or more coats of the cement, according to the thickness of the specimen to be mounted. A thin coat of the zinc is then to be applied by means of the tin table, the cell filled with glycerine, and the object placed therein as usual; the cover is then applied at one edge to the ring of cement, and gently loosened until it touches all around its circumference when, being slightly pressed, it will be found to adhere quite firmly. A delicate spring compress is then to be applied, to prevent possible displacement of the cover, and the whole slide thoroughly washed in cold water with a brush, to remove every

trace of glycerine. Then remove the compressor, and replace upon the tin table, and apply a thin coat of the cement to the edge of the cover, to be repeated until the slide is finished. The same process is applicable to deep glass cells. I send you herewith a specimen mounted by above process in one of the latter, that you may judge of the quality of the work; also one of the compressors which I use.—*W. H. Walmsley, Philadelphia, U.S.A.*

Seeds of Collomia coccinea.—I have received from a friend a few of these very interesting seeds; he gave me these directions to obtain a most curious sight:—"Having obtained your seeds, take a sharp pocket-knife, and cut off as small a quantity as possible of the outer skin, then place it upon your fluid slide, and cover it with a small square glass slip; at first use your 1-inch object-glass, and it looks like a small piece of dirt, but directly you put the smallest quantity of water in at the top of the slip, so as to touch the seed, myriads of spiracles will start away from it, and continue so to do for nearly ten minutes. I have tried this experiment a great many times, and always with success."—*P. J. C.*

"Half-Hours with the Microscope."—This is the title of a really useful little book, written by Mr. John Phin, the editor of the "Technologist," and published by the Industrial Publication Company, New York. It contains practical hints on the selection and use of the microscope, and is intended for beginners. Everything relating to the working of the microscope, with all its accessories, and also the various modes of mounting, &c., are very clearly and patiently detailed in this little work, which we heartily commend to all who are looking out for such a book.

Royal Microscopical Society.—At the recent meeting of this society, attention was called to a number of specimens sent to the society a short time since by Mr. Hanks, of San Francisco, and which had since been mounted for the cabinet by Mr. Loy; also to some slides of *Aulacodiscus Kittoni*, presented by Mr. Thomas Curties from material collected on the late Congo Expedition, by Mr. Martin, H.M.S. *Spiteful*. Mr. C. Stewart then gave an interesting account of the structure and development of sponges, freely illustrating his remarks by drawings upon the black-board, and concluded by stating his reasons for believing that the well-known perforations in oyster-shell were really made by the sponge. Mr. Hickie exhibited to the meeting some photographs from Germany of *Navicula crassinervis* and *Frustulia Saxonica*, and read some letters from Dr. Rabenhirst and Herr Seibart in support of his opinion that the two were widely distinct.

Glands, &c., of Insects.—A paper, containing researches on the functions of glands in the digestive apparatus of insects has just been read before the French Academy of Sciences, by M. Jousset. He was able, in *Blatta orientalis*, to obtain the liquids in the gland itself before entrance into the alimentary canal. Another contribution to the same meeting was on the floral glands of *Parnassia Palustris*, new physiological functions, by M. Hæckel. These glands are a carnivorous organ.

Glycerine Mounting.—Permit me to point out to "S.L.B.," that, in using gold-size and crocus of iron as a finishing varnish, I am not acting in opposition to Dr. Carpenter's advice, because the two or three coats of plain gold-size which intervene, and are allowed to become *thoroughly dry*, effectually prevent all contact of the fluid with the finishing coat. Dr. Carpenter's caution applies only to varnishes in contact with the mounting fluid, and not to finishing varnishes.—*J. R. T.*

Liquid Cement.—Can any of your many readers give a recipe for making a cement similar in properties and appearance to the useful cements which are now so much in vogue for mending glass and china? I have found them valuable in many matters connected with science, but for general use they are too expensive, when a small bottle costs a shilling; probably the cost of making would be considerably less.—*R. S. T.*

ZOOLOGY.

The Ceratodus.—Professor Huxley, in his paper recently read at the Zoological Society, on *Ceratodus*, the Queensland reptilian fish—so nearly resembling the *Ceratodus* of the New Red Sandstone—in describing the brain of that fish for the first time, showed how closely it approached that of the Lepidosiren, and how that in some points it resembled the Selachian rather than the Ganoid type. He gave cogent arguments against the theory of Gegenbauer, with reference to the typical conformation of the fore limb, and laid special stress on the affinities of the animal with *Chimæra*.

Recent Zoological Discoveries.—The address to the Royal Society, recently delivered by the president, Dr. Hooker, refers to the dredgings of Dr. Gwyn Jeffreys and Captain Loftus Jones on the Greenland coast, from 70° 30′ N. lat. to the entrance of Davis's Straits, and in the Atlantic as far as 25° 58′ W. long., in depths of which the greatest was 1,785 fathoms; and temperature soundings were taken at eleven out of the twenty stations indicated in the Admiralty Instructions. Among the valuable results obtained are the fact that the fauna of the Greenland seas agrees with its land flora in being mainly Norwegian, there being (with the exception of the Echinoderms) an absence

of many North-American forms, which, as it appears, have not been found eastward of the meridian of Cape Chidley, in Labrador. A remarkable mollusk, previously dredged at a depth of about 1,000 fathoms off the coast of Portugal by the *Porcupine*, and which, when first found in a fossil state in the newer tertiaries of Sicily, was supposed to be an extinct type, reappears in the deep waters of Davis's Straits; and a *Campanularia* was found, specifically identical with one discovered this year in the opposite hemisphere, viz., in Kerguelen's Land, by Mr. Eaton, the naturalist of the Transit of Venus Expedition to that island. A most singular sponge-like diatom, named by Dr. Dickie *Synedra Jeffreysi*, with living *Globigerinæ* entangled in the colloid collecting-matter of its frustules, was taken in the towing-net.

Black-throated Diver in Essex.—A specimen of the male black-throated diver (*Colymbus arcticus*), in fine plumage and condition, was shot in the river Blackwater during the last week of December, near Maldon, Essex.

The "Challenger" Expedition.—This important expedition is now approaching its close. The *Challenger* has arrived at Valparaiso, and was to sail thence to the Falkland Islands by way of the Straits of Magellan. The scientific party had explored a series of active volcanoes in an unfrequented island of the North Pacific, and were rewarded by the magnificent spectacle of surging waves of molten lava and spray of brilliant fire. The party stayed a fortnight at Tahita, exploring everything of interest there. After leaving Tahita, forty days were spent voyaging to Chili, sounding and dredging proceeding with most satisfactory results. The island of Juan Fernandez, which was first reached, was unanimously declared to present the most beautiful scenery of any throughout the travels. Several new varieties of birds and twenty-four novel species of ferns were here obtained. From Monte Video the *Challenger* will make a straight course for home, deeply laden with the spoils of the longest continuous voyage on record.

Rare Bird.—On the 25th of August last, a fine specimen of the Hyacinthine Gallinule (*Porphyrio veterum*) was taken in this neighbourhood. It was found in one of our "rheins," or running ditches, unable to fly, having apparently been shot at. By the help of a dog, it was chased to a hedge, and there captured. It pecked savagely at the faces of all who came near it, and one boy whose curiosity got the better of his caution, received a blow which pierced the lip and wounded the gum. In fact, its bill, when wielded with such hearty good—I should rather say ill—will, was a formidable weapon. The blue on the neck, breast, and belly of the bird is of a very lovely hue. I shall be glad if any of your readers could inform me whether the bird is often found in this country. I have never seen one before. Its wings do not seem to be well adapted to long flights, and it may have escaped from some private collection. After a day or two's captivity it was killed and stuffed, and is now in the possession of its captors.—*H. M. M., Badgworth, near Weston-super-Mare.*

Rare Birds.—*Rara Avis*, Eastwell.—A splendid eagle was shot in Eastwell Park, a few days ago, by one of the Duke of Edinburgh's gamekeepers. It measured 7 ft. 2 in. from tip to tip of wings. The keeper saw the huge bird strike down a pheasant and eat it completely, leaving only the tail-feathers. It is stated that three or four eagles have recently been seen in the neighbourhood.—*Henry Lamb, Maidstone.*

Montrose Museum.—Egyptian Geese (*Chenalopex Ægyptiacus*).—Fine specimens, male and female, of this rare aquatic bird were obtained by the Natural History Society last week, having been shot in the tidal basin. This bird, according to Herodotus held sacred by the Egyptians, is a native of Northern Africa. The pair, doubtless disgusted at the alienation of the Suez Canal, were about to adopt the South Esk Estuary as their future home, when met by this cruel reception.—*R. B.*

BOTANY.

Variations in Colour of Flowers.—Many of your correspondents have given localities where plants have been found varying in their normal colour, but as yet I have observed that none have been in the county of York. I therefore wish to inform your readers that the following variations in colour have been seen by me in that county during the last five years. I found at Settle a white specimen of the *Malva moschata*. At Bramhope and Pool I found white specimens of *Campanula rotundifolia* and *Campanula rapunculus*. At Ossett I found a white specimen of *Digitalis purpurea;* and at Horbury I found one plant bearing flowers of a light blue tint, and dotted at the edges with white. At Settle I collected a rose-coloured specimen of the wild hyacinth which Hooker and Arnott say is rare. In many places I found white specimens of the same plant. At Swillington I found a white specimen of the *Ballota nigra*. At Adel a white specimen of *Ajuga reptans*, and at the same place several white specimens of *Cardamine pratensis*. At Kippax I have found two white specimens of the *Cichorium intybus*. At Harewood I have found several white specimens of the *Veronica officinalis*. At Arthington I found a white specimen of the *Veronica Beccabunga*. At Corkridge a blue specimen of the *Anagallis arvensis* (Poor man's

Weather-glass). At Esholt a rose-coloured specimen of *Oxalis acetosella*. I collected two white specimens of *Solanum dulcamara* two years ago, but cannot remember the locality. The places that I have mentioned above are all (excepting Settle) within walking distance of the large town of Leeds. —*Fred. Casson.*

The Plants of Whiteley Dean.—Whiteley Dean may be a new place to many of the readers of Science-Gossip for botanical rarities, yet it has been for many years noted. There are many specimens to be found there that are not to be met with for miles elsewhere. Buxton, in his "Guide to Plants growing Seventeen Miles round Manchester," speaks of *Malaxis paludosa* as growing near to Milurow. No doubt this is the place indicated. It has been thought that this plant was locally extinct, but after a few years' diligent search I have had the good fortune to meet with it, but at a different place to where it used to grow, and I have reason to believe that it is due to an old veteran botanist in our locality, Mr. James Schofield, of Lady House, near Milnrow, who tells me he once removed one to a different situation. It is very rare,—I only found some half-dozen specimens. Another plant I have not seen for some time, common Butterwort (*Pinguicula vulgaris*), but I believe it is still in existence. I have sometimes found it rooted up, which I always attributed to the sheep-keepers, who believe with Whithering that it causes diseases in sheep. The Round-leaved Sundew (*Drosera rotundifolia*) is very common, almost as common as anything in the Dean; also, the Ivy-leaved Bell-flower (*Campanula hederacea*), Bog Pimpernel (*Anagallis tenella*), Bog Asphodel (*Narthecium ossifragum*), but not plentiful. Marsh Arrowgrass (*Triglochin palustre*), Great Water-scorpion Grass, Forget-me-not (*Myosotis palustris*). Another locally-common plant said to be scarce in most parts of England is the Mountain Spignel or Bald-money (*Meum athimanticum*), also one of the Cow-wheats (*Melampyrum pratense*). Amongst the mosses I may mention a few: *Mnium subglobosum*, Fountain Apple-moss (*Bartramia fontana*). I have found in fruit this last summer *Hypnum aduncum*, *H. cuspidatum*, *H. fluitans*, *H. commutatum*, *Sphagnum acutifolium*, *S. squamosum*, *S. obtusifolium* (the former fruited very freely this last summer), *Dicranum squamosum*, *Atrichum laxifolium*, and *Bryum pseudo-triquetrum*.—*B. Belfield, Lane Bottom, near Milnrow.*

Hierochloe borealis.—With reference to the early or late time of flowering of this plant, Science-Gossip, November, p. 262, I would beg to lay before your readers the testimony of one of the most eminent of living professors of botany. He says: "The *Hierochloe borealis* usually flowers in April. It is certainly an early-flowering plant." I suppose this testimony is decisive.—*R. W.*

Petasites fragrans (Sweet-scented Butterbur, or Coltsfoot).—Perhaps it will interest some readers of Science-Gossip to know that this plant is very abundant in the neighbourhood of Tenby, and especially so in the village of Penally, where I gathered a fine bunch of it in flower on December 24th. I also gathered it near Carmarthen last winter, in flower, immediately after some very severe weather.—*H. Lewis Jones.*

Cladium Mariscus.—Your correspondent F. H. Arnold asks where *Cladium Mariscus* is to be found in the southern counties. I can help him to one locality, for I gathered the plant last autumn from the banks of the lake in Arundel Park, Sussex.—*H. E. Wilkinson.*

Centaurea solstitialis.—This plant, which I mistook for a yellow variety of *C. Calcitrapa*, and which I mentioned as being so abundant here in a field of lucern in the autumn of 1875, did not appear again this year, although the lucern was allowed to remain. I suppose that the summer here was not long enough for it to ripen its seeds, or that the frosts of spring destroyed the young plants. It is mentioned in an old work which I have referred to, as being a native of Montpellier. I sent specimens to two of our regular correspondents, Mr. G. C. Druce, of Northampton, and Mr. W. Green, of Bristol, but unfortunately my notice sent to Science-Gossip was held over until the winter, when the plants had perished. Hooker gives its habitat as fields in south and east of England. I shall be glad to know from any of our correspondents in what locality it is an established plant. *C. Calcitrapa* is very abundant here as a roadside weed.—*Dr. Morton, New Brompton, Kent.*

Colours of Crocuses.—Before we accept the conclusion of Mr. Thirkel, may I ask him if his crocuses may not possibly be an example of the Darwinian theory that the "fittest survive"? I have known a bed of blue crocuses to appear year after year of the same colour, and have in my own gardens some thousand or more bulbs which I believe always come true, still I think it most likely, if a number of blue and yellow crocuses were planted together, that the yellow variety, being the hardiest, would propagate faster, and ultimately crowd out the blue ones.—*Dr. Morton, New Brompton, Kent.*

"Flora of Eastbourne."—This is the title of a handsome book, well printed, and compiled by Mr. F. C. S. Roper, F.L.S., the President of the Eastbourne Natural History Society. This society is well known for the thorough manner with which its members have worked out, and are still working out, the natural history of their neighbourhood; and we

take this volume to be the best specimen of the kind of labour in which they are engaged. It contains a list of all the species and varieties of flowering plants, ferns, &c., growing in the Cuckmere district, East Sussex, and is illustrated by a geological map, by means of which we can trace the influence on the local geographical distribution of plants by geological conditions. To local botanists this book will be a welcome boon, and we congratulate Mr. Roper on the successful manner in which he has worked out the botanical details. The introduction to this work is exceedingly good, well written, and presents all the conclusions that can be drawn relative to the distribution, &c., of the plants, very clearly indeed.

The Guernsey Isoetes.—In Science-Gossip for November, p. 258, I stated that this plant, first noticed in Science-Gossip in 1873, p. 113, might be the *I. Hystrix Duriei*, but certainly not the *I. Hystrix*, Bory, *of Algiers ;* Mr. Baker, Curator of the Kew Herbarium, quite confirms this statement. He tells me that the Guernsey plant is *I. Hystrix*, var. *subinermis* (unarmed, spineless), Durieu, in "Balansa Pl. Alg. Exs.," 1851, No. 27, adding, "We have the same form in Kew Herbarium from Caprera, Algeria, French Landes, Phrygia, Smyrna, Castile, &c. ; it is, in fact, more common than the typical Hystrix with the big spines, as photographed by you." Again, he says, "Best differential character of *Isoetes Duriei* and *Hystrix* is in the macrospores (see specimens enclosed)." In the description of the *Isoetes* by Grenier and Godron, it is stated that the different species are chiefly distinguished by the two sorts of sporanges, one with macrosporocarpes situate at the axils of the external leaves, containing from 40 to 200 macrosporanges in each sporocarpe; the other with microsporocarpes situate at the axils of the interior leaves, containing above 1,000,000 microsporanges in each sporocarpe, resembling fine flour (fine farine). If, therefore, the different species are to be determined by the formation and characters of the macrosporanges, a very powerful microscope must be used in the examination of them. All the macrosporanges described by Grenier and Godron are stated to be more or less *tubercled*, except *I. Hystrix*, which is very finely *reticulated*, showing the differential character referred to by Mr. Baker. I am not aware that the *anatomy* of any of the *Isoetes* has been drawn or engraved, except the *I. lacustris* in Sowerby, and in plate 12 of Hooker and Arnott's "British Flora" ; or that with the exception of the *I. lacustris*, figured in Sowerby and in Science-Gossip for 1873, p. 54, and the Algerian plants in the "Flora of Algeria" (a work rarely to be met with, and which I have for some time endeavoured in vain to obtain both in London and Paris), a copy of which may be seen in the Library at Kew; with these exceptions, I am not aware of figures of any entire plant of *Isoetes* (except also the plants illustrated in the last number of Science-Gossip) having been engraved and published. The total absence of spines in the *I. Hystrix subinermis Duriei*, gives it externally such a different appearance from the typical plant (*I. Hystrix*, Bory), that no one could take them to belong to the same species without examining the macrosporanges. I presume the *I. Hystrix*, var. *inermis*, had not been discovered in France in 1855, the date of Grenier and Godron's "French Flora," or it would have been noticed by them; and the same reason would account for its not appearing in the "Flora of Algeria," where it no doubt was discovered subsequently.—*T. B. W., Brighton.*

Flora of Rodriguez.—In his recent address to the Royal Society, Dr. Hooker referred to Mr. Balfour's report on the "Flora of Rodriguez," and stated it as a very remarkable fact that one of the two new genera of flowering plants which have been found belonging to the natural order *Turneraceæ*, is most closely allied to a peculiar Panama genus; and that one of the new species has only a single congener, which is a Pacific Island plant.

Botany for Schools.—A nicely got-up little elementary volume on Botany, intended for schools and science classes, and compiled by Mr. H. J. Browne, M.A., has just been published by Messrs. Mullan, of Belfast. It deals principally with structural botany, but gives an outline, with useful but brief descriptions, of classificatory botany as well.

GEOLOGY.

The Origin of the Primary Rocks.—At the last meeting of the Geological Society of London, a paper on "The Physical Conditions under which the Upper Silurian and succeeding Palæozoic Rocks were probably deposited over the Northern Hemisphere," was read by Henry Hicks, F.G.S. The author, after pointing out the lines of depression explained in his former paper to the Society, now further elaborated the views then propounded by him, by carrying his examination into the higher Palæozoic series and into more extensive areas. Beginning at the top of the Lower Silurian, where he first recognizes the evidence of a break in the Palæozoic rocks, he proceeded to show that this break was restricted to very limited areas, and almost entirely confined to the parts which had been first submerged, and where the greatest thickness of sediment had accumulated on both sides of the Atlantic, and hence where the pre-Cambrian crust had become thinnest. On the European side this break occurred where volcanic action had taken place, and has doubtless to be attributed to the

combined action of upheaval of portions of the crust and the heaping-up of volcanic material, the latter in some cases forming volcanic islets of considerable extent. He strongly objected to look upon these breaks, even in the British area, where they are most marked, as evidence of a want of continuity over other and far greater areas, or to admit that even where there was conformity in the rocks at this point, "great intervals of time are indicated, unrepresented by stratified formations." The conformity found in extensive and widely-separated areas is proof also that a gradual contraction took place of an enormous portion of the crust in the northern hemisphere in Palæozoic times; and the breaks at the close of the Lower Silurian and in the Devonian are not indications of an arrest in the general subsidence. After indicating the changes which must have taken place in the climate from the gradual spreading of the water and the evidence to be derived from the consideration of the deposits and the faunas, the author drew the following general conclusions:—1. That the condition of the northern hemisphere at the beginning of Palæozoic time was that of immense continents in the higher latitudes, traversed by mountainous ranges of great height, but with a general inclination of the surface, on the one side (European) to the south-west and south, and on the other side (American) to the south-east and south. 2. That these continents were probably covered, at least in their higher parts, with ice and snow; and that much loose material had consequently accumulated over the plains and deeper parts, ready to be denuded off as each part became submerged. This would account for the enormous thickness of conglomerates, with boulders, grits and sandstones, found in the early Cambrian rocks, and also to a certain extent for their barrenness in organic remains. 3. That the depression over the European and American areas was general from at least the latitude of 30° northwards; that the parts bordering the Atlantic were the first to become submerged; the lower latitudes also before the higher. 4. That the depression could not have been less altogether, for the whole of the Palæozoic, than 50,000 feet; and that conformable sediments to that extent are found over those parts of the areas first submerged, and which remained undisturbed. That volcanic action was chiefly confined to parts of the regions which became first submerged; that the immediate cause of these outbursts was the weakness of the pre-Cambrian crust at those parts, from the great depression that had taken place, it being too thin there to resist the pressure from within, and to bear the weight of the superincumbent mass of soft sediment. 5. That the seat of volcanic action at this time was at a depth of probably not less than 25 miles, as sediments which were depressed to a depth of from 9 to 10 miles do not indicate that they had been subjected to the effect of any great amount of heat, and are free from metamorphosis. 6. That the climate at the early part of Palæozoic time was one of very considerable, if not extreme, cold, and that it became gradually milder after each period of depression. That towards the close of the Palæozoic, in consequence of the elevation of very large areas, and to a great height, the climate became again more rigorous in character. 7. That the various changes which took place over the northern latitudes during Laurentian and Palæozoic times allowed marine and land life to develop any progress in those areas at interrupted periods only; consequently most of the progressive changes in the life had to take place in more equatorial areas, where the sea-bottom was less disturbed, and where the temperature was more equable. Any imperfection therefore in the Palæontological record belonging to these early times should be attributed to these and like circumstances; for whenever an approach to a complete record of any part of the chain is preserved to us, the evidence points unmistakably to an order of development, through a process of evolution from lower to higher grades of life.

Fossils near London.—Will any reader of Science-Gossip kindly inform me of any localities in the West of London where I could obtain fossils and minerals?—*A. Y. R. F.*

NOTES AND QUERIES.

Juniperus communis in Surrey, Science-Gossip, p. 234.—The Common Juniper varies considerably, no doubt, in height, according to circumstances favourable to its growth or otherwise; but I well-nigh dropped my spectacles when I read that "near Mickleham, &c., it invariably reaches a considerable height, say from 10 to 15 feet." The Caterham plant may then undoubtedly be considered a starved or a dwarf condition of *J. communis;* yet the plant of Ray, Smith, and others known as *Juniperus nanus*, whether it really be a distinct species or only an alpine variety, is widely different from the lowland plant altogether, although it is difficult to give very tangible characters to distinguish the two plants; our North Wales *J. nanus* is certainly most distinct in appearance from any condition of the common species which I ever met with in the chalk districts of England. One would think a very sheltered situation, and some other unusually favourable conditions of soil, &c., must be needful to have made the Common Juniper on the Mickleham downs attain such a growth as 10 or 15 feet in height!—*W. P., Llandderfel, Oct.*, 1875.

Tails of Caterpillars.—I think I can throw a little light on the subject mentioned by your correspondent "J. R. S. C." in the October number. A few years ago I reared some larvæ of the Puss Moth (*Cerura vinula*), and my astonishment was great to notice that, when spinning their cocoons, they continually emitted a liquid from a large opening under the true mouth, the like of which I had never seen in any other larva. This accounts for the fact mentioned, that it is only after the last change

of skin that this apparatus is required. When young, the larva can throw out a long thread like a filament, of a dark reddish colour, from each of its two caudal appendages. These are probably used to brush away ichneumon flies. The emission of the liquid as a means of defence by the adult larva is a peculiarity I have never observed. The rosy slit has, to me, an additional interest when considered in connection with the very strange appearance of a mask about the head of this creature, which may be said to possess black eyes, rosy cheeks, and cherry lips, or the semblance of them, at all events.—*T. W. Wood, F.Z.S.*

Slit Windows.—In the October number of Science-Gossip there appear illustrations of the outside and inside elevations of a slit window. I know little of architecture, and shall most likely make my ignorance apparent, but should like to inquire if this class of window belongs to any particular period? there having been discovered recently a row of six exactly similar windows in a building (formerly used as infirmary to the great Benedictine monastery of St. Mary, at Worcester), which stands on the eastern bank of the Severn, between the river and the cathedral and monastic buildings. The ground-floor was used as the bakery, the upper story as infirmary. A modern brick mansion had been erected about and over this stone building, completely enveloping the latter. It appears to have been partially taken down and then built over. The pulling down of the dwelling-house some two years ago discovered the massive stone walls and the windows as I describe—six in a row, closely set together. If any one will give information as to the supposed date of the structure, it may interest many in the immediate locality—if not elsewhere. I forgot to say the ruin is left standing, and appears quite an object of interest beside the noble and lately restored cathedral.—*A. E., Worcester.*

Lobsters.—I should be much obliged to any reader of Science-Gossip who would kindly inform me what are the characteristic motions of lobsters, and how their organs are adapted to perform them. —*C.*

A Visit to Lynton, N. Devon.—The delightful little town of Lynton is situated on the top of a hill (430 ft. above the sea-level), at the foot of which lies the fishing village of Lynmouth, where the united rivers of the East and West Lynn fall into the sea, after twisting and tumbling over rocks, through beautiful glens and valleys, which abound in this romantic part of England, now made notorious by Blackmore in his novel, "Loorna Doone." The town of Lynton is built most irregularly, and reminds one of Wales. In the cottage gardens different varieties of fuchsias are grown, and flower luxuriantly. About a mile from Lynton is the well-known "Valley of Rocks," which is approached either by the carriage-road or the cliff walk overlooking the sea, and (on a clear day) the Welsh coast is seen. Following this path, you suddenly come upon the *débris* of rocks, some still remaining erect on the heights above, others hurled down by wind and storm. Another place worth seeing is the private ground of Mr. Riddell, opened twice a week to the public, who are expected to pay a gratuity at the lodge towards the Lynmouth Hospital. The river West Lynn here flows over boulders, forming miniature waterfalls and cascades. Many flowers and ferns have been brought here by the proprietors of Glen Lynn (as this charming spot is called), and they grow profusely, as if habituated to the soil. The Watersmeet should also be visited,—a lovely valley, where the two rivers, the Brendon and the Lynn, unite: the road to it is very fine. It was here that I found the red Sedum, *Orpine telephium,* among a heap of stones by the river Lynn. Last, but not least, I must mention the drive to Glenthorne (the property of Mr. Halliday) over the Bren Barrow Moor, which, in September, when the gorse and heather are in full flower, is one mass of purple and gold. There is a British camp on the Moor. Space forbids me to say more; but I must add that any one who wants to see real English scenery should pay a visit to this charming place, situated at an easy distance from Ilfracombe.—*Helena J. Taylor, Folkestone.*

How do Crickets Produce their Sound?—I have frequently tried to find out how crickets produce their well-known chirrup; but only on one occasion did I succeed in inducing a cricket to exercise itself in that direction, they having apparently a great objection to "sing" in captivity. On the occasion I refer to, I put two crickets,—a pair,—under a tumbler, whereupon the male immediately raised its elytra, and shuffled them together, producing a noise which would be best represented by the word "shilly." It repeated this several times with its head towards the female, who probably considered herself insulted, for she literally clawed his face with one of her hind feet, supplementing this action with a sudden and violent kick, and from that time the male took no more notice of her.—*J. P. Blackett, jun.*

The Growth of Mistletoe.—Will any of your readers be kind enough to supplement the following list of trees which support mistletoe? The oak, poplar, lime, sycamore, apple, mountain ash, and fir. I have seen it growing on all of these but the first, about which, however, there is no doubt. The mountain ash, I believe, to be an unusual tree to support the mistletoe, but an example can be seen from the Great terrace of Windsor Castle. Once only have I seen it on a fir-tree; unfortunately I omitted to notice the kind. The growth was curious; a large number of very small plants were growing upon the stem of the tree, on the side towards the south. The tree was in the forests of Goisern, in the neighbourhood of Ischl.—*R. S. T.*

"Crabs out of Water.—Some years ago I kept a small crab (*Carcinus Mœnas*) in a bell-glass, with some rock-work for him to come out of the water on. If the glass cover got tilted on one side he managed to get out, and was often found about the room. Towards summer the tank was moved out of doors, under a verandah; he soon got out and could not be found; but four or five days after, on moving some flowerpots and plants from a damp corner, the crab was discovered remarkably vigorous, with a large worm in his claws, which he was very particular in insisting taking with him, on being returned to the tank, from which he soon escaped again, and finally disappeared.—*H. F. jun.*

Dogs Eating Wasps.—I am curious to know whether it is a common thing for dogs to eat wasps, and if they are known to possess some means of nullifying the effect of the sting? On several occasions this summer, I watched with much interest the excitement caused by wasps to a black and tan terrier. The moment one appeared on the window,

he commenced barking furiously, trying with his paws to knock it down, which, if on the lower panes, he generally succeeded in doing; but the curious part was, that as soon as the insect was on the ground, the dog began turning it over and over with his tongue for about ten minutes, all the time making a peculiar hissing noise, dragging it sometimes half across the room, and eventually eating it with the greatest relish, but apparently unconscious of the danger of the sting if eaten immediately after death; but if he could pounce on one in the act of flying, he swallowed it at once with impunity, evidently regarding it as a *bonne-bouche*, from the frantic manner in which he pursued any that came in his way.—*S. M. P.*

White Varnish for Microscopic Cells.—I should not advise "W. G. C." nor any amateur to trouble themselves with making their own varnishes, as dealers in microscopic material can supply them ready for work at nearly the price the material would cost an amateur.—*T. McG.*

Tadpoles, &c.—In reply to A. F. Maingay, allow me to say, that in my article on tadpoles of newts, &c., the seventh line from the end, the word *frog* ought to be substituted instead of *newt*. It then reads as follows:—"The tadpole of the *frog* has gills, and a tail during part of its life . . . the tadpole of the newt has the tail *permanently*," &c.—*H. E. Forrest.*

"Mocha Stones" are so called, because found in abundance at Mocha, in Arabia. They are found in Amygdaloidal Trap, which appears to have been originally vesicular lavas, through which waters charged with siliceous and calcareous solutions had percolated for ages until they finally filled up the cavities with agates, &c. The dendritic markings are metallic, not fossil vegetation, to which they bear a resemblance. It is needless to say that these igneous rocks are a very old formation. The varieties of agate, onyx, carnelian, jasper, &c., which are so abundant on the beach at Aberystwith, most probably come from some trap rocks on the north side of the bay. The metal in the transparent agate or chalcedony is mostly iron, which gives the colours, dark green, yellow, and reddish brown, seen in the Mocha, and the green and brown moss agate.—*H. C. R.*

Mocha Stones.—I send the following extract from Sowerby's "Popular Mineralogy":—"On this subject Phillips observes,—'Dr. McCulloch has instituted a very ingenious inquiry into the nature of those vegetable appearances of different colours visible in the more transparent chalcedonies, which are termed Mocha, and more particularly in those which are less so, termed Agate. Close observation, added to chemical experience, induces the conclusion that many of these appearances are owing to the existence in the stone of aquatic confervæ; that these plants sometimes appear perfectly in their natural form and colour; in others they seem to be coated by oxide of iron, which occasionally hides the form of the plant, and discolours it. Mosses and some varieties of lichen have been observed, and occasionally chlorite, which sometimes is so disposed as to represent a vegetable. A chrysalis, probably of a moth (?), was observed in an onyx-agate in a ring in the possession of Earl Powis.' Against the experience of Dr. McCulloch we should be sorry to offer an opinion, but we think the subject requires further investigation. Mocha stone is a most beautiful, valuable agate, consisting of white cornelian, with patches here and there of a deep brown colour and dentritic appearance. It derives its name from Mocha, in Arabia, whence it is brought." With regard to the Mocha being found at Aberystwith, I am afraid that it is only in the shops that it will be met with; large quantities of pebbles are imported from Germany (some with colouring matter, especially blue, infused into them), and when stones are brought from the shore to the lapidary to be cut and polished, they are frequently thrown away, and the foreign ones already prepared are returned to the happy finders. There are beautiful specimens of Indian green moss agates sold at Aberystwith, and people are told that they are found upon the beach there, but only in the winter months, when visitors are scarce, either being of a shy nature, or of migratory habits, like the fieldfare, &c.—*E. M.*

On collecting Hymenoptera, &c.—Some of your correspondents encumber themselves with more bottles, tins, and boxes than there is any necessity for; the simplest, most efficient, and least expensive plan is the following:—Laurel-leaves, as Mr. Blackett states, are the best, gathered in spring, but not too young, if pounded in a mortar, instead of cut up merely. A good-sized bottle of the bruised leaves will be good for killing Coleoptera, Hymenoptera; in fact, all insect life during the year. I use mine now in December which were gathered last June. The most convenient collecting-bottle is an ordinary two-ounce or four-ounce wide-mouth, with turned-back rim, and tight-fitting cork. In the centre of the cork pierce with a borer a hole, in which a glass tube will fit, open at both ends. I use a one-drachm tube bottle, the bottom of which I cut off by notching with a file, applying a red-hot ring of wire, and drop a little water over it: this cracks it round tolerably straight. Hold the edge in a gas flame for a few seconds to melt off the sharp edge, tie a piece of muslin round the bottom, and cork the mouth; fit this tube tightly into the cork of the larger bottle, which fill half or three parts full of bruised leaves. This forms a cheap and convenient double bottle. The larger insects are easily put into the large bottle, while the tube is kept for the smaller or any rare species. They are killed in a few seconds, and will keep in capital condition for setting for some weeks, or even months if needed. It is well, however, not to keep them too long. With this single bottle, I think, all a collector's requirements are met. Chloroform, cyanide of potassium, sulphur, and ammonia are all nuisances, and can be very advantageously dispensed with.—*E. Wheeler.*

Stratagems of Birds.—A writer in the October number asks if any of the readers of Science-Gossip ever noticed a similar instance of birds using stratagem to decoy persons from the vicinity of their nest. Quite a number of our American birds will behave in a manner similar to the chaffinch mentioned,—such as the quail, killdeer, prairie-hen, duck, turtle dove, and, in fact, a majority of birds that build their nests upon the ground, as many a rural youth is able to testify from experience.—*R. F. Kerr, Greencastle, Ind., U.S.A.*

Ticks on Mice.—About a month ago, whilst taking a walk, I observed in my path a short-tailed field-mouse, which appeared to be nibbling something on the ground. On touching it, instead of running away as I expected, it rolled over, gasping, and apparently in great pain. I carried it home,

and, upon making a closer examination than I had previously done, observed something in the fur near its neck, which appeared to be living. On attempting to seize it with the forceps it started off, but I at length secured it, and found it to be an immense tick, about the size of a small pea, but resembling the ordinary mouse flea. On removing this creature from the mouse, it seemed much relieved, but eventually died. Is it usual to find ticks of such a large size?—*G. M. Doc.*

Capture of Cynthia Huntera in Hants.—On p. 256 of last vol. Science-Gossip a correspondent briefly records the capture of this species in Hampshire. Without making the slightest imputation on the good faith of the writer, I would ask him whether he has not mistaken some variety of *Cardui* for its American relative? The existence of *Huntera* as a British insect having always been considered most apocryphal, an undeniable occurrence would be worthy of more than a passing notice.—*Charles Lovekin.*

A "Singing Mouse."—A short time ago I had the pleasure of listening to a veritable singing-mouse. The creature was caught, by means of a trap, in a cupboard, where a kind of faint warbling noise had long attracted my attention. Its song, which resembled that of a distant canary, was full of pleasing variations, and often lasted fifteen or twenty minutes without interruption. When thus engaged, its whole body seemed to tremble. Its ears were large for a mouse, and its tail was of unusual length, but in other respects it resembled the ordinary "nibbler." I kept the "little stranger" in a glass vessel for some time, when it unfortunately escaped, and fell a prey to the merciless cat.—*Geo. O. Howell.*

Basalt.—"B. B. W." and "W. R. J." ask for information on this subject. I beg to refer them to the *Geographical Magazine*, alluded to in my note on this subject in last October number of Science-Gossip; also to draw their attention to the last paragraph of that note. The deeper their inquiries go, the more likely they are to detect the great geological error of classifying igneous and unstratified rocks together.—*H. P. Malet.*

Folk-lore about the Nettle.—Are there any modern instances of belief in the superstition noticed by Brand, that bunches of nettles hung up exert a preservative influence, acting as a charm, for example, in the preservation of beer from turning sour?—*C.*

Fauna and Flora of the New Forest.—In reply to your correspondent "E. D. M." (Science-Gossip for December), I venture to suggest Wise's "New Forest; its History and Scenery." It is not of course devoted exclusively to the Natural History of the district, but it includes chapters on the Geology, Ornithology, and Botany; and in the appendices will be found lists of the birds, flowering plants, and Lepidoptera peculiar to, or common in this locality. It is published by Smith, Elder, & Co. I do not know the publishing price, as I purchased my copy at a bookstall for (I think) 4s. 6d. I think it probable that Messrs. Walford Bros., booksellers, of the Strand, would give "E. D. M." some information respecting a "Fauna" or "Flora" of the district if such there be; but I have never heard of such a work, nor of the existence of a "Natural History" Society, or "Field Club," at either one or other of the three places indicated by your correspondent.—*N. P.*

Ticks on Dormice.—I have a dormouse, who is much infested with white ticks, which come when he is asleep. If any of your correspondents can give me any advice as to the remedy, I should be much obliged.—*J. H. B. Brooke.*

Labels for Orders of Plants.—Seeing we have a good catalogue of British Plants, also a good set of labels for same, may I name another hint, viz., a set of labels for the covers of the orders, with the numbers of those orders, same as those in London Catalogue, but larger type; this would save trouble and time in writing them, and would, upon reference, catch the eye sooner than writing, the covers generally being in coarse brown paper. The sets when printed could be advertised, and no doubt made to pay if neatly and boldly printed.—*A Subscriber.*

Irish Antiquities.—In the January number of the Science-Gossip, "G. G." has made an oversight, when he states that I have described the oval bullân at Slieve-na-Cailliagh as post-Christian. In describing the bullâns it was necessary to figure and describe all types, and of that at this locality it is distinctly stated, "seem to be *pre-Christian*, as they have only been found in the interior of the De Danaan tuiams or carns." The tuiams at New Grange and Dowth, and the numerous carns on Slieve-na-Cailliagh, are supposed, on good evidence, to have been sepulchral monuments and tombs of the De Danaan kings. The battles of South and North Moytura, between the De Danaans and the Firbolgs, in which the latter were vanquished, are supposed to have been fought in the year A.M. 3303, and the De Danaan, according to the Four Masters, held the country for 197 years. If, therefore, these tuiams and carns were erected by the De Danaans, they and the enclosed bullâns must be pre-Christian. All these monuments have already been described—that of New Grange years ago, in one of the tracts printed in the Appendix to Dr. Gerrard Boate's "Natural History of Ireland," a reprint of which was published some years ago by Thorn, of Dublin. Since then, among others, Wilde, and recently Fergusson, have given elaborate descriptive plans and sketches of the New Grange and Dowth monuments; while Du Noyer and Conwell have described those on Slieve-na-Cailliagh. The latter antiquarian's excellent sketches and description will be found in the "Proceedings of the Royal Irish Academy," and at present he is engaged on an exhaustive history of the place.—*The Writer of "Sketches in the West of Ireland."*

Sparrows and Peas.—It is a very great pity that so many have such a prejudice against birds, as injurious; and consequently destroy them: when they really do an infinity of good, and are easily prevented from doing much harm. I always encourage them coming about the garden and premises, and have not at all suffered from doing so, besides having the pleasure of watching them and seeing how tame they will become. As to my peas, they never suffer. When I sow them, I simply stretch two lines of worsted over the row, and they are never touched.—*E. T. Scott.*

Juniper Bushes.—Whilst rambling on the hills near Steyning, I saw a quantity of juniper bushes with large quantities of berries upon them. I have not met with any elsewhere, and a botanical friend of mine asserts his belief that they are to be met with (growing wild) in no other part of Sussex. Can any of your readers inform me if the idea is correct?—*T. C., Brighton.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

W. H.—Dr. Carpenter's Lecture to the Working-Men of Bristol on a piece of Limestone is published in *Good Words* for October, 1875.

Dessau.—We believe the second volume of Nicholson's "Manual of Zoology" was published by Messrs. Blackwood, Edinburgh.

J. L. V.—It is not an uncommon thing for the Brimstone butterfly (*Gonioptery.r rhamni*) to be temporarily roused from its state of hybernation by an unusually warm day, so as to be seen fluttering in our lanes.

Robert East.—The beetle is called *Pristonychus terricola*, a very common species. The Hair-worm you took from it is undoubtediy the *Gordius aquaticus*, or common Horsehair worm of our ditches, which, in its earlier life history, is parasitical within beetles and other insects.

B. H.—The sport in the *Helichrysum* sent us is not uncommon in composite flowers, although it is not so often met with in the everlastings as in the daisy, &c. See Masters's "Vegetable Teratology" for an explanation of monstrosities of this kind.

F. A. Lake.—We should think any large nursery gardener would be able to supply you with the ferns you name. Apply to Messrs. Hooper & Co.

E. H. (Sheffield).—The date you name, December 29th, is very early for the Skylark to commence its song. But it usually begins in January, if the weather be open and mild. Undoubtedly it was owing to the unusually warm weather at the end of December that you heard it. We ourselves heard the Missel Thrush in full song on the forenoon of the 24th December last.

R. S. Thomas.—The "Micrographic Dictionary," published by Van Voorst, is the best book a hardworking microscopist can obtain for such purposes as those you mention.

W. J.—The mineral you forwarded to us from a coal-seam in the neighbourhood of Swansea is sulphate of lime.

Xeno.—Get Cooke's "Microscopic Fungi," with coloured illustrations, published at 6s. by Hardwicke, 192, Piccadilly.

Robert W.—Your fossil coral is *Holysites catenulatus*, commonly called "Chain Coral." It is one of the characteristic forms of the Upper Silurian rocks.

Ada P.—London, in his "Hortus Britannicus," gives the origin of the generic name Paris (in *Paris quadrifolia*), as derived from "*par*, equal; regularity of parts."

P. O.—Write to Hardwicke, 192, Piccadilly, for their catalogue of scientific works. You will find there more than one work of the kind you want.

Greenwood.—If you apply to Messrs. R. & J. Beck, 31, Cornhill, London, you will obtain all the information you seek concerning the Reflex Illuminator, and likewise its adaptation to the microscope you name.

H. J. Ryder.—For information concerning chalk fossils consult Mantell's "Medals of Creation," Taylor's "Geological Stories," Nicholson's "Manual of Palæontology," Owen's "Palæontology," the volumes of the Palæontographical Society of London, the Decades of the Geological Survey, Dixon's "Geology of Sussex," and Whitaker's "Geology of the London Basin."

C.—Obtain Nicholson's "Advanced Text-book of Zoology," and you will there find all the information you require concerning the locomotion of lobsters, and the organs which produce it.

R. N.—See Gosse's "Naturalist in Jamaica" for a detailed account of the motions of the Flying-fish (*Exocœtus volitans*) as witnessed by himself. There can be no doubt of its power to rise and fall in the air, and even to beat the atmosphere with its extended fins.

N. T. S.—Your plants are (1) *Galeopsis versicolor*, (2) *Prunella vulgaris*, (3) *Linaria utilissima*.

P. Howell.—The "Migrographical Dictionary" is published by Van Voorst.

E. Sandys.—The *Zoologist* is still in circulation, and edited by the well-known naturalist, Edward Newman.

EXCHANGES.

Rhubarb, beautifully showing spiral vessels, and Raphides, in exchange for objects of interest.—S. C. Hincks, Runfold, Farnham, Surrey.

First-class Slides, or cash, offered for Chalk Dust from Hollow Flints, or rich Foraminiferous Material, Deep-sea Soundings. Dredgings, &c.—C. L. Jackson, 11, Hesketh-street, Southport.

A Baker's Erecting Prism and a fine Tourmaline, for a Swift's Condenser, or a Webster Condenser, or a Polariscope, or a Kelner Eye-piece.—W. Statham, Green Bank, Shottle, near Derby.

Offered:—14*a*, 14*b*, 17, 18, 18*b*, 59, 79, 99, 136, 157*b*, 161*b*, 167, 218, 259, 301, 318, 331, 338, 341, 509*b*, 534, 576, 603, &c., "Lon. Cat.," 7th edition, for other plants.—John Wm. Burton, 35, Hemans-street, Liverpool.

Iodea superba (fine plant) for its value in Foreign Shells.—J. Rogers, 27, Oldham-road, Manchester.

First-class Slides will be given for unmounted Fleas from Bat, Mole, or Squirrel. Communicate before sending any.—E. Wheeler, 48, Tollington-road, Holloway, London, N.

Wanted, *Hierochloe borealis*, for Sussex Plants.—F. H. Arnold, Fishbourne, Chichester.

Wanted, some Larvæ of *Tipula oleracea*.—W. White, Litcham, Norfolk.

Conchology.—Exchanges invited, in rare British Marine, by J. T. Marshall, 1, Portland Cottages, Portland-place North, Clapham-road, London.

For portion of the Euplectella Sponge for mounting send *good* Material or Slides. Will give good Slides for Material, especially clean Diatoms.—W. Tylar, 165, Well-street, Birmingham.

"Science-Gossip" for 1869-70, unbound, for any objects of interest.—F. M., 40, Bengal-street, Bradford.

A refrigerating Microtome in good order, offered for a Half-plate Portrait Lens, or long folding Camera, or Microscopic Accessory Apparatus.—Address G. G., 11, North-terrace, Alexander-square, London, S.W.

Duplicates, *V. Io*, *C. Hayle*, *C. Edusa*, *Argeolus*, *L. Sinapis*. Wanted, *S. Ligustri*, *H. Linea*, *H. Comma*.—H. Davis, Teme Villa, Bushy-park, Totterdown, near Bristol.

Wanted, a supply of Barbadoes Earth, unprepared Many things to offer in exchange.—George H. Stubington, Basingstoke.

BOOKS, &c., RECEIVED.

"The Arctic World" (illustrated). Edinburgh: Messrs. T. Nelson & Sons.

"A Short History of Natural Science," by Arabella B. Buckley. London: John Murray.

"Wages and Wants of Science-Workers," by R. A. Proctor. London: Smith, Elder, & Co.

"A Month in Mayo," by G. Hooper. London: Hardwicke.

"Popular Science Review." January.

"Monthly Microscopical Journal." January.

"Land and Water." January.

"Journal of Applied Science." January.

"Monthly Journal of Education." January.

"American Naturalist." December.

"The Fancier's Journal" (Philadelphia). December.

"Potter's American Monthly." December.

"Ben Brierley's Journal." January.

&c. &c. &c.

Communications Received up to 10th ult. from:—W. K. B.—F. K.—G. H. K.—Dr. C. C. A.—H. G. G.—W. H.—T. S.—C. A. O.—Col. G.—A. J. B.—G. H. S.—B. H.—H. L.—T. McG.—A. H. L.—S. C. H.—J. R. S. C.—H. E. W.—N. P.—J. F.—H. C. R.—W. L.—W. R. H.—J. H. M.—H. D.—R. B.—W. H. M.—W. K.—J. H. B. B.—C. P. H.—F. H. A.—R. E.—W. S.—G. S.—H. E. F.—W. W.—E. W.—C. M.—T. R.—M. G.—H. J. R.—R. D. E.—J. C. S.—R. S. T.—J. W. B.—H. C. R.—Dr. J. H. G.—T. H. P.—W. A. L.—G.—W. J.—J. H. B.—Dr. M.—C. L. J.—J. R. T.—E. T. S.—F. A. L.—A. B.—H. L.—H. L. J.—P. T. C.—J. D. S.—H. M. M.—G. G.—W. H. P.—G. S. S.—A. J. R. F.—F. M.—W. T.—W. R. H.—A. P.—G. H. K.—R. N.—J. H.—J. T. M.—G. C. D.—J. H. B. B.—W. G.—B. H.—J. L. V.—&c. &c.

A GOSSIP ABOUT NEW BOOKS.

PRESSURE of valuable literary material has prevented our noticing many scientific books published during the latter part of last year. Rarely have we had more valuable contributions to natural science in such a short space of time. Darwin's long-looked for work on "Insectivorous Plants" (London: John Murray) showed us, happily, that the keen and careful research of its author has not yet shown any signs of giving way, nor have his powers of philosophical generalization been weakened. In this volume, of nearly 500 pages, we have a series of experiments on the so-called "carnivorous" plants, and many of the results seem ludicrous when regarded from the old notion of how a plant ought to behave. Indeed, we are learning every day how arbitrary is our old classification, and how little we have hitherto actually known about organic objects. We need no longer point to the lowest forms of animal and vegetable life as the platform where both meet; these "carnivorous" plants behave as animals also, when it is to their advantage to do so. In calm and philosophical language, and yet in a style so admirably suited to the novel facts and their meanings that the reader willingly gives himself up to the subtle charm of the book, Mr. Darwin discourses on the sundews and the movement of their "tentacles," as he calls the red hairs on the leaves; on Venus's Fly-trap (*Dionæa muscipula*), and the irritation of its filaments; on *Aldrovanda vesiculosa*, a plant which captures crustaceans; on the various species of Butterwort (*Pinguicula*) and Bladderwort (*Utricularia*); as well as of other plants, such as *Drosophyllum, Roridula, Byblis*, &c., which affect "insectivorous" habits. From experiments made on these various plants (all of which are related in the volume before us), there can be no question as to their digestive powers, and their capability of assimilating nitrogenous food. Not long after the appearance of "Insectivorous Plants" the reading world was surprised by another work on "The Movement and Habits of Climbing Plants," by Mr. Darwin (London: John Murray). Such accurate industry has rarely been equalled, and never surpassed. In this latter volume we have those phenomena of the dissipation of motion exemplified by numerous climbing plants, which seem almost to partake of intelligence or instinct. Leaf-climbers, tendril-bearers, and hook and root climbing-plants of all kinds are minutely described; the experiments made by Mr. Darwin upon them almost convincing us that the force of habit in certain of them is nearly analogous to instinct. This book contains more than 200 pages, and in lively interest is equal to that on Insectivorous Plants. Had only these two volumes appeared last year, they would have left their mark on our scientific literature. And there can be no doubt whatever they will largely influence the spread of the doctrine of evolution, which alone among extant theories is able to account for those singular phenomena in plants which form the subject-matter of these two treatises.

In Geology and Physical Geography it is some time since there appeared a work of such importance as "Climate and Time," by James Croll (London: Daldy, Isbister, & Co.). Mr. Croll's theories as to the origin of the Glacial Period by astronomical causes have long been held in high estimation by our best geologists. In this large volume we have the whole subject worked out in its geological relations, and a theory of the secular changes of the earth's climate elaborated in the completest manner. No geologist of any pretension can afford to do otherwise than make himself thoroughly

familiar with this remarkable book. As the author endeavours to account for those evident extremes of tropical and arctic conditions which the same areas seem to have experienced in various of the geological periods, both from the laws of the diffusion of heat by currents, and by the varying positions of the earth and the sun, we have various chapters devoted to a closely-reasoned out description of them. Those on ocean currents in relation to the distribution of heat over the globe, are masterly expositions. After dwelling in detail upon all the cosmical and solar and terrestrial conditions which can possibly affect climates, there follow a series of chapters in which evidence is produced of warm inter-glacial periods in that to which geologists have given the special name. All the causes which could produce both extremes are described, as well as the origin of the submergences and elevations which we know then succeeded each other. The volume concludes with two chapters on Glacier Motion. From this brief outline of the contents, our readers will perceive that Mr. Croll's work is of a most exhaustive character. This and the work of Mr. James Geikie, on the "Great Ice Age," will do more to finally settle the cause of the Glacial Period than anything which has before been written. Mr. Croll's book is written in that terse and unadorned language which convinces us a man is in earnest; and we expect it will long continue to be a work of authoritative reference for the mass of questions which it discusses.

We confess that the "History of Creation," by Prof. Hæckel (London: H. S. King & Co.), although well translated, and edited by Prof. Ray Lankester, has somewhat disappointed us. It is an important book, and, to a great extent, one that will make its mark. It will be largely read by all naturalists, but few will concede the points so harshly and hastily raised by the author. It is a history of creation from an extremely evolutionistic point of view, and is crowded with facts which, it seems to us, can only be explained on that theory. The author is a remarkable man, and anything from his pen will have great weight. But the philosophical discussion of the weighty questions involved in the history of creation is spoiled by an anti-theological bigotry, which breaks forth here and there in a degree which is contrary to every canon of good taste. If the author choose to originate a creation without a creator, we find no fault as a question of theory, although we must confess that it seems very contradictory for a man to use his own high intellect in discovering natural laws, and then to turn round and declare such laws could originate *without* Intelligence! If readers will compare the intemperate tone of Hæckel's work with the philosophical reverence of Herbert Spencer's "First Principles," they will see that the doctrine of evolution, instead of detracting from a First Cause, clears it of its anthropomorphism, and elevates it into a higher region. But if our readers can peruse Hæckel's two volumes without sheering off into a dislike of the author's narrowness, we can promise them a really great treat, for they dwell on embryological questions especially in a manner we have not yet seen attempted.

"Animal Parasites," by Professor Van Beneden (London: H. S. King & Co.), is one of the most readable volumes of the most valuable "International Scientific Series." It deals with a group of objects about which the student finds it difficult to find a text-book; and although Van Beneden's classification of parasites is more popular than scientific, all readers will be intellectual gainers by its perusal. It is one of the most charmingly written scientific books we have read for some time, and we heartily commend it.

"Zoology for Students," by Dr. Carter Blake (London: Daldy & Isbister), is, in many respects, a long way behind the time. Although prefixed by a thoughtful essay from the pen of Professor Owen (which we fail to see has anything to do with Dr. Carter Blake's work), it does not by any means come up to the standard now required in an advanced zoological examination. We cannot understand a naturalist writing a *text*-book in which the sub-kingdom *Radiata* is still maintained, as in this book it is. Moreover, Dr. Blake makes the Radiata include *Polyzoa*, as well as Anthozoa and Echinodermata!

Mr. J. E. Harting's "Rambles in Search of Shells" (London: Van Voorst) is an attractively written book, illustrated by excellent coloured and most faithful likenesses of our land and fresh-water shells. The young student could not begin with a better book. Even more elaborately got up is the volume entitled "Our Summer Migrants" (London: Bickers & Son), by the same author. Any one who has read Mr. Harting's ornithological works is aware how earnest and enthusiastic he is in the study of our native birds. This volume is superior to the best he has yet written, both in descriptive style and in matter of fact, for it deals with the most charming of our feathered tribes—the *summer* migrants. Further, the chapter devoted to each bird is headed with one of Thomas Bewick's cuts; and as the paper and type are both excellent, the binding elegant, and the pages gilt, our readers may imagine that this book is one to thoroughly enjoy.

Messrs. Lockwood & Co. have issued a new edition of that most valuable storehouse of conchological and geological information to students, Woodward's "Manual of the Mollusca," with an illustrated appendix by Professor Ralph Tate. We are glad of this, for the last edition did not do the original author justice, and no man is better able both to edit this work and to bring the subject-matter up to the most recent discoveries than Mr.

Tate. This edition, therefore, is one to be especially sought after by all those who wish to study recent and fossil shells. Principal Dawson's "Dawn of Life" (London: Hodder & Stoughton) is an exhaustive but popular treatise on his favourite fossil the *Eozoon*. All the arguments in favour of the foraminiferal nature of this doubtful fossil are marshalled in logical and telling order, varied with a few backhanded blows at evolution. Nevertheless, it is a book which the geological student will read with pleasure and profit, and is undoubtedly a valuable contribution to the literature of geology.

Professor Mivart's "Lessons from Nature" (London: John Murray) will interest a good many people in various ways. It will show them how an eminent naturalist, not averse to the doctrine of evolution, and a Catholic, regards the advanced scientific doctrines of the present day. Although this volume has been already before the public in another form, we thank both author and publisher for giving it to us again in this completer and more attractive style. Dr. Mivart attacks the vague and misleading appeals to Nature so constantly made by many scientific men; and, leaving the defensive, also breaks a lance against the *Ant*anthropomorphism of many writers. In the essays which now form the chapters of this book, the reader will find the theories of Spencer, Bain, Lewes, Huxley, Darwin, Wallace, Galton, Lubbock, Tyler, ably combated, although somewhat Socratically, and will not be surprised, after Cardinal Manning's recent argument that the Romish Church has always been "the true exponent of science and morals," to find Professor Mivart supporting him at the close of his book by declaring that "a prescience has watched over the Church's definitions, and that she has been so *guided* (the italics are the author's) in her teaching as to be able to harmonize and assimilate with her doctrines the most modern theories of physical science."

"A Short History of Natural Science," by Miss Arabella B. Buckley (London: John Murray), gives us an account of the progress of scientific discovery from the time of the Greeks to the present day. It is well and intelligently written, and will prove very serviceable to others than the "young and unscientific people," for whom the author modestly states she has written it. The book contains nearly five hundred pages, and is an acceptable and useful contribution to our libraries. "Our Place among the Infinities" (London: H. S. King & Co.) is from the facile pen of R. A. Proctor. Our readers will therefore expect them to be thoughtful and attractive. The book is a series of essays, contrasting our little abode in space with the infinities around us. The chapters on the "Past and Future of our Earth," and a "New Theory of Life in other Worlds," are especially interesting. "The Origin of the Stars," by Professor Ennis (London: Trübner & Co.), is a rather high-sounding treatise on the evolution of the stellar universe, and will be read with great interest and delight by all astronomical students. This is the first English edition, its success in the United States having been very great. "Time and Time-tellers," by James W. Benson (London: Hardwicke), is an exceedingly well got-up little volume, amply illustrated, on all kinds of watches and clocks, ancient and modern, and is an interesting treatise on all relating to these useful articles, well written, and sparkling with well-told anecdotes. "A Month in Mayo," by George Rooper (London: Hardwicke), contains some lively characteristic sketches, sporting and social, of Irish life. The author is a thorough and well-known adventurous sportsman, and he is one of the few who are good naturalists as well, with a keen eye for the many traits of animal life which a sporting naturalist has so many opportunities of observing. Mr. Rooper has made good use of his opportunities, and his style is so attractive and cheery that we are bound to finish the book if we begin the first chapter. "The Universe," by Dr. F. A. Pouchet (London: Blackie & Sons), is the third edition of a well-written and popular account of "the Infinitely Little," gorgeously illustrated and bound, so as to form a most charming gift-book. Of the contents enough has already been said. In few places are the author's facts to be trusted, although we are glad to see that many glaring errors which appeared in the first edition have been corrected in this. Still, we must regard a book from the point at which the author wrote it, and, as he states in his preface, that he never intended this to be a learned treatise, we are bound to believe him. We are not sure whether these books and those of Figuier have done more good than harm in inoculating students with false notions, which require many years and much study to be corrected. "The Canary Book," by Robert L. Wallace (London: the *Country* office), is, on the other hand, an unpretentious but thoroughly useful little volume, on the most charming of our domestic pets. It contains full directions for the breeding, rearing, and management of exhibition canaries and canary mules; their treatment in health and disease, together with a full description of all the different varieties of canaries, and their various points of excellence. The illustrations are excellent, and the whole tone of the little book is marked by the earnestness of an enthusiast.

Few modern books of travel have made such a name as the "Abode of Snow," by A. Wilson (Edinburgh: W. Blackwood & Sons). Although originally written for *Blackwood*, and then republished in a well got-up volume, the first edition of the latter was out of print in a few weeks, and a copy of the second is now before us. A more readable book we have rarely met with. The author

has a vigorous style, and such a keen eye for natural phenomena, especially of a geological and physical geographical character, that his delineations are graphically impressed on the reader's mind. And when we remember that the country thus delineated is the Himalayan mountains to the table-land of Thibet, those who have not read this book will understand how thoroughly interesting it must be. Travellers like Mr. Wilson do more than simply interest us; they contribute materially to natural science by so vividly describing natural scenery which few can ever behold. We heartily commend this volume to our readers.

A great many books have been issued since the Arctic expedition left England concerning the countries it has gone to explore. None of them, however, come up to "The Arctic World," published by T. Nelson & Sons, London. It is a large quarto volume, charmingly bound in crimson and gold, and profusely illustrated by some of the best full-page and other woodcuts we have seen since those of Wolf. The letterpress is of a large type, and agreeable to the eyes; and the matter is well written, although the chief Arctic travellers are largely laid under contribution. The plants, animals, and natural phenomena of the Arctic regions are described and figured in a very truthful style. Those who cannot go to these high latitudes must do the next best thing—get this attractive work.

THE MICROSCOPE AND MICROSCOPIC WORK.

No. III.—By F. Kitton.

In our last paper we gave a short *résumé* of some of Leeuwenhoek's labours with the microscope. In the present paper we propose to continue our sketch of his studies with that instrument. Space will not allow of more than short excerpts, and these we shall make from the essays on the Spider and Silkworm, as being the most interesting. Those of our readers who have paid any attention to the former animals will, perhaps, be somewhat surprised that he overlooked those very extraordinary organs the male palpi. With this exception Leeuwenhoek seems to have had a very fair acquaintance with the structure of this "animal." He says:—"I have often seen the spiders, when dropping or falling, as it seemed, from a tree, stop or support themselves in midway by the help of one of their hind feet, which they continually apply to the thread as they open it. These feet are each of them furnished with three nails or claws, standing separate or apart from each other. Two of these claws are at the extremity of the foot, and each of them is formed with teeth, or notched like the cuts in a saw, growing narrower towards the bottom; and with these they are enabled to hold fast the thread, in like manner as the pulley or wheel used by clock-makers in their thirty-hour clocks is contrived to lay hold of the clock-line by means of the groove being also narrow at bottom. For the more perfectly understanding this formation, I caused the following figure to be drawn."

The illustration is very good, and although not quite accurate, gives a good idea of what we now call the "combs." The general accuracy of Leeuwenhoek's figures is the more surprising, as he does not seem ever to have prepared them in any way; and doubtless the use of caustic potash, &c., for the purpose of bleaching, was entirely unknown to him.

Fig. 25. Claw of Spider (from Leeuwenhoek).

These instruments are now supposed to be used for the purpose of cleaning the web, but no doubt they serve for both purposes.

To Leeuwenhoek belongs the credit of the discovery of the poison-fangs of the spider. The existence of these organs as the means of conveying a poison was questioned as recently as 1867, when several correspondents of Science-Gossip argued for and against their existence. Mr. R. Beck, in a paper on this subject, remarks that Leeuwenhoek had discovered the nature of the fangs, and gives a copy of his figure, which we here reproduce. As Leeuwenhoek's observations are of considerable interest, I transcribe them:—"I have often heard it said that the spider has a sting, with which it is also reported it can kill a toad; but no one could tell me in what part of the body this sting was placed; therefore I concluded that, if there was one, it must be in the posterior or hind part, as in other animals and insects; but on examination I found this opinion to be groundless. The spider is, however, provided with two organs or weapons answering every purpose of a sting, which are placed in front of the head, just below the eyes, and, when not in use, they lie between the two shorter feet. These weapons, or instruments of offence,

which are bent in the nature of claws, are very similar to the sting of the scorpion and fangs of millepeda; and in each of these fangs (for so I will call them) is a small aperture, through which in all probability a liquid poison is emitted by the spider at the time it inflicts the wound."

Leeuwenhoek's discovery was disputed by some of the learned men of the day. Dr. Mead, in his "Essay on Poisons," doubted the fact, in which he was at first supported by Henry Baker, F.R.S., who had not been able to detect the aperture; but on further examination, made on a large foreign spider from the island of Nevis, he detected the orifice, and "showed the same to Dr. Mead, who was much pleased with the discovery."

Dr. Mead, in his "Mechanical Account of Poisons," 3rd edit., p. 88, says that he was "inclinable to believe that Mr. Leeuwenhoek had been mistaken; and that the fangs were capable of inflicting a wound only, into which a poisonous liquor was instilled afterwards by a short white proboscis thrust out of the spider's mouth."

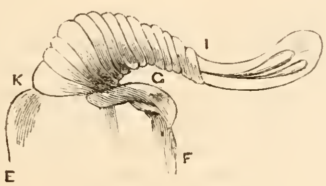

Fig. 26. Ovipositor of Spider.

To test the poisoning power of the spider, he tells us that he "took a small frog, whose body was about an inch and a half in length, which I put into a glass tube together with a large spider, in order to see the action of the two animals when brought together, and I observed the spider pass over the frog without hurting it, though with its fangs displayed as if to attack the frog. Upon this, I caused the frog to fall against the spider, who thereupon struck his fangs into the frog's back, making two wounds, one of which exhibited a red mark and the other a purple spot. I then brought the frog to the spider a second time, who thereupon struck his fangs into one of the frog's fore feet, whereby some few of the blood-vessels were wounded; and having provoked the spider a third time he struck both fangs into the frog's nose, presently after which I took the spider out of the glass. The frog thus wounded sat without motion, and in about the space of half an hour it stretched out its hind legs and expired."

His experiment on another and a larger frog was not successful, its superior size and strength no doubt enabling it to resist the effects of the venom.

Leeuwenhoek now turns his attention to the formation of the nest, and the deposition of the eggs, of which he gives an interesting description. During his observations on the nidification, he detected the method used by the spider for depositing its ova. He says, "I was desirous to see a spider laying its eggs, which at length I obtained a sight of, and observed that they were not emitted from the same part as usual in all other minute animals, but from the fore part of its belly, not far from its hind legs, and near the place I observed a kind of little hooked organ, handsomely shaped, which I had often before seen in the animal, and could not imagine for what purpose it was designed; but now, I perceive that it extended over that part whence the eggs issued, and I therefore conjectured that its use was to deposit them in regular order within the web prepared to receive them. This hook I then separated from the spider's body, and, placing it before the microscope, I delivered it to the limner that he might make a drawing of it as it appeared to him."

This drawing is given at fig. 26, "E F G I K, and therein between the letters I and K certain folds or wrinkles appear, this organ being so formed as to have a greater extent of motion action than usual. The letters E F denote the part which was joined to the spider's body." In order to discover whether the eggs could be hatched by artificial warmth sooner than the usual time, which is in the spring, he enclosed some on the 1st of January in a glass tube, which he constantly carried about with him. On the morning of the 17th he found twenty-five young spiders, and in the evening of the same day he counted above a hundred and fifty young ones: on exposing them to the cold they became motionless, but recovered on the application of warmth; on the 21st he was able to discern their eyes, and on the 25th they began to open webs, in the same manner as full-grown spiders. Leeuwenhoek was at a loss to understand how "these young spiders could be supplied with nourishment, considering that the natural food of these creatures is the substance of other insects; but I now perceived that they fed on the barren eggs which had been left in the glass, and they afterwards devoured one another till they were reduced to very few in number."

That wonderful production, the web of the spider, was not likely to escape the notice and investigation of Leeuwenhoek, and accordingly we find him studying the spinnerets, of which a tolerably accurate description and figure are given; but he is most struck with the amazing fineness of the threads, and calculates their diameter: his standard of comparison is, as usual, a hair from his beard. He says, "For this purpose I placed the thickest part of the hair before the microscope, and, from the most accurate judgment I could form, more than a hundred such threads placed side by side could not equal the diameter of one such hair. If then we suppose such hair to be of a round form, it follows

that ten thousand of the threads spun by the full-grown spiders when taken together, will not be equal in substance to the size of a single hair. To this we add, that four hundred young spiders at the time when they begin to open their webs are not larger than a full-grown one, and that each of these minute spiders possesses the same organs as the larger ones; it follows that the exceedingly small threads spun by these little creatures must be still four hundred times slenderer, and that consequently four millions of these minute spiders' threads cannot equal in substance the size of a single hair."

Leeuwenhoek was unable to detect zygosis in these animals, although he had frequently endeavoured to do so; he enclosed a female with three males in a glass, and she flew at them "with so much fury, and wounded them to such a degree, that blood issued from their legs and feet."

"These are my chief observations on the spider, an animal held in such detestation by many that they dread even the sight or approach of it, but in which we find as much perfection and beauty as in any other animal."

Leeuwenhoek was advised by the Royal Society to examine the barren and fruitful eggs of the silkworm. His first experiment was to ascertain whether it was possible to promote the growth of the silkworm in the autumn. The following plan was therefore adopted: "I put into a flat screwed box some eggs six weeks old, which in the daytime I carried in my pocket, and at night placed beside me in bed, that they might continually keep warm; and in another box of the same kind I put some more eggs three weeks old, and these my wife (who was always warmly clad) constantly carried in her bosom."

On opening some eggs which he had kept by him for above a month, he observed a minute silkworm about the thickness of a hair, but he was not able to distinguish any particular parts of its body. In the space of ten days more he found larger worms in the eggs, and on examining those carried by his wife he found still larger, which by the microscope appeared as large as one's finger. These he proposed to give drawings of, but the animals soon dying, they lost their figure, and neither the head nor tail, nor any other part of their bodies was distinguishable. After this the eggs dried up, and he was obliged to wait until the beginning of May before he could resume his observations. On the 20th of that month he could perceive not only several parts of each animal's head, but also a great number of small vessels, which branched out into others, extending all over the body. These vessels he supposed to be veins and arteries conveying the blood. (I need scarcely say that these vessels were trachea, and not blood-vessels.) The description of his investigations on the structure of the silkworm and its moth occupies fifteen quarto pages.

Leeuwenhoek now proceeds to examine the scales of fishes, and soon detects the scales of the eel, of which he gives a very good figure.

His friends, the heterogenists, are not content with his demolition of their assertions that the weevil is generated spontaneously, and he receives the intimation that in a book published at Rome by a learned Jesuit, named Philippo Borranni, it is asserted that animalcules or small living creatures can be produced out of inanimate substances, as mud or sand, by spontaneous generation, according to the doctrine of Aristotle. "And it seems that this learned gentleman is himself very desirous to see my observations on the subject. I shall therefore proceed to consider Signor Borranni's positions, and I doubt not that upon investigation they will be found of no weight or substance, but will vanish like smoke or vapour." The heading to this essay will perhaps be sufficient for the modern reader,—"The author's refutation of the doctrine of equivocal or spontaneous generation in the instance of the Sea Mussel, with a particular description of that species of fish."

Not being acquainted with Borranni's book, which by the way, I should imagine soon found its way into the *Index Expurgatorius*, I am unable to say whether the learned Jesuit considered sea mussels animalcules, or, if he did not, whether he contended that they were produced spontaneously; if he did, the author of the essay, assisted by his microscope, soon proved that such was not the case.

The essay on the circulation of the blood is very interesting, but much too long to transcribe here. As may be supposed, when the rudeness of his instruments are taken into consideration, many errors may be detected in his observations; for example, he considers the blood-corpuscles are spherical, excepting in the fishes. He observed, although imperfectly, the circulation in the gills of a young cock, in the ears of white rabbits, and the wing of a bat.

But it was when he placed a young tadpole under one of his instruments he saw the circulation of the blood in full perfection, and he says, "a sight presented itself more delightful than any my eyes had ever beheld, for here I discovered more than fifty circulations of the blood in different places, while the animal lay quiet in the water, and I could bring it before the microscope as I wish." What would have been his delight if he could have seen the circulation under a modern binocular!

Leeuwenhoek made microscopic observations on various substances, as coffee, mace, cochineal, hops, the cocoa-nut, the herb Periwinkle (wherein he refutes the opinion "that it does not bear any seed"), on quills, on human hair, the hair and wool of animals, and on the eye of a whale. The learned Dutchman concludes his last essay with the following remarks:—

"When we duly consider the more perfect workmanship of the Divine artist, we must confess that those things which we discover by our microscopes and industry are but as the shadow of those which hitherto remained concealed from us, not only in such small animals as this now under consideration, but also in larger animals and in plants.

"It is to be hoped, then, that the inquirer into Nature's works, by searching deeper and deeper into her hidden mysteries, will more and more place the discoverers of those truths before the eyes of all so as to produce an aversion to the errors of former times which all those who love the truth ought diligently to aim at. For we cannot in any better manner glorify the Lord and Creator of the Universe, than that in all things, how small soever they appear to our naked eyes, but which yet have received the gift of life and power of increase, we contemplate the display of His omniscience and perfection with the utmost admiration."

The following is the original of the last paragraph:—

"Want wy en konnen den Heer en Maaker van het geheel Al, niet meer verheerlyken, als dat wy in alle zaken, hoe klein die ook in onse bloote oogen mogen zyn, als ze maar leven en wasdom hebben outfangen, zyn Al-wysheit en Volmaaktheit, met de uiterste verwondering sien uit steken."

(*To be continued.*)

THE JEWS AND PRE-HISTORIC IRISH ANTIQUITIES.

THERE is no direct evidence concerning an immigration of *Jews* into Ireland. But that there is strong and satisfactory evidence of a so-called *Phœnician* immigration no one will dispute. It is asserted in their own records, which are very ancient. (See "Annals of Ireland," by the Four Masters, and Keatinge's "History of Ireland," and others.) These again are supported by Phœnician relics, by evident traces of prevailing Baal-worship, and by the language. The words uttered by "the little Carthaginian" in the "Pœnulus" of Plautus are pure Irish. (See "Essay on the Antiquity of the Irish Language." Dublin: 1772.)

If then the *Phœnician* immigration be admitted as established, it becomes a question how far their manners and customs may not have been influenced by the Israelites, and, indeed, whether there may not have been a considerable blending of the races. The Phœnician and Hebrew languages were identical. (See part ii., vol. ii., *Transact. Bib. Arch. Soc.*, where this is proved, and where the above-mentioned passage in the "Pœnulus" of Plautus is *transliterated* into *Hebrew*.) But (what is more to the point in this paper) it will be recollected that Hiram, king of Tyre, had the high privilege accorded him of assisting at the building of the Temple, where a large number of the skilled workmen were Phœnicians (1 Kings v. 6, 17, 18), and the head-man of these cunning craftsmen was "the son of a woman of the daughters of *Dan*, and his father was a man of Tyre" (2 Chron. ii. 13, 14).

Jezebel, the wife of Ahab, was daughter of Ethbaal, king of Sidon (1 Kings xvi. 31).

But, besides this identity of language and social intimacy, the Israelites, or a large portion of them,—the tribe of Dan especially,—like the Phœnicians, were a seafaring people. Thus Dan had ships as early as B.C. 1285 (Judges v. 17); and the navies of Solomon and some of his successors were renowned. The *Jewish Chron.*, May 28th, 1875, reports a lecture delivered at the Jews' Infant School, on the 23rd May, to Jewish working men, by Rev. A. L. Green, who stated as follows:—

"Our forefathers, in their happiest times in the golden age of the nation's glory, were indeed the public carriers of their day, travellers for commercial enterprise to all the then known countries, near and far. The ships of Solomon rivalled the Phœnician navy. The ports of Elath and Eziongeber were filled with the ships of Tarshish, which sailed down to the Ælanitic Gulf of the Red Sea on to the Indian Ocean, to Ophir, to Sheba, to Arabia Felix, to India, and to Ceylon; and through the Pillars of Hercules; brought home copper from Cyprus and tin from Spain, possibly from Cornwall. The Talmud is filled with special regulations bearing on the exceptional wants springing from these various avocations. Synagogues were from earliest times attached to special centres of industry, and frequented by special traders; and a workman's ritual was specially arranged to suit the artisan, the landsman, and the seafarer. The pursuits of commerce, in its various ramifications, were ordered by an admirable code of commercial law. The laws of agency and insurance and hypothecation were codified. Promissory notes and bills of exchange were formulated even in Mishnaic times."

It has been pointed out that the Dannites appear (possibly from their proximity to Tyre and Sidon) to have been more thrown among the Phœnicians than the other Israelites; and it is remarkable that a people called "Tuatha da Dannan," or tribe of Dannan, are amongst the earliest civilized colonists of Ireland. They were renowned for their skill in the arts and sciences, especially architecture, and for their attention to schools. The Irish historians ascribe the knowledge of these Dannans to "their intercourse with the Phœnicians." They are said to have come from *Egypt*, and to have resided a long time in *Greece*.

In "Phœnician Ireland," by Villaneuva, translated by H. O'Brien, p. 184, there is this curious remark on the Dannans:—"I recollect that in the Phœnician language is to be found the word

danihein, signifying illustrious, generous, noble; or rather, Danin, for Danani, or Danita, the inhabitants of the city of Dan, at the foot of Mount Lebanus, the spot where the Phœnicians worshipped the graven image given them by Micah (!), and where Jeroboam had erected the golden calf."

As for the long residence of these Dannans in Greece before they came to Ireland, Latham's "Ethnology of Europe," p. 137, has the following:—"I think that the eponymus of the Argive Danai was no other than that of the Israelite tribe of Dan; only we are so used to confine ourselves to the *soil* of Palestine in our consideration of the history of the Israelites, that we treat them as if they were *adscripti glebæ*, and ignore the share they may have taken in the ordinary history of the world. The seaports between Tyre and Ascalon, of Dan, Ephraim, and Ashur, must have followed the history of seaports in general, and not have stood on the coast for nothing. What a light would be thrown on the origin of the name Pelop-o-nesus and the history of the Pelop-id family, if a *boná fide* nation of Pelopes, with unequivocal affinities and contemporary annals, had existed on the coast of Asia! Who would have hesitated to connect the two? Yet with the Danai and the tribe of Dan this is the case, and no one connects them."

There is strong evidence, however, of Jewish colonies in *Spain* from a very early date. In Margolionth's "Lectures," p. 24, I find, among many others, records of two very ancient Hebrew inscriptions, which had existed at Saguntum. One ran—

> "This is the grave of Adoniram, the servant of king Solomon, who came to collect the tribute . . . . . and died on the day . . . . ."

and another records the death of a prince of the army of Amaziah, king of Judah:—

> "Raise, with a bitter voice, a lamentation for the great prince; the Lord has taken him . . . . . to Amaziah," &c.

The voyage from Spain to Britain, and therefore, of course, to Ireland, was very trifling. Appian tells us that, from Spain to Britain was only half a day.

> "Quando in Britanniam, una cum sætu maris transvehuntur quæ quidem trajectio dimidiati diei est." *

But to revert to the Phœnicians. Although much of their worship was gross in the extreme, as indeed was the idolatry into which the Israelites frequently fell away, I find that "in their (the Phœnicians') oldest temples were *no images*. But there were rude fetishes, conical or oblong stones. . . . Such a stone was called by the Greeks *baitulos*, and Bochart and others of a former age traced these to *Bethel* and to the pillar which Jacob erected there."

* "This must be a mistake for a *day and a half*, unless, under the name of Spain, the ancients sometimes comprehended a large portion of the coast of France as far as Cape Ushant."

Thus, then, whether Ireland was colonized partially by Israelites or solely by Phœnicians, there seems to have been a sufficient intimacy between the races to account for any resemblance which may be held to exist between the ancient Irish churches and the Ark of the Covenant. COL. G.

ON THE SIRENIA.

By THOMAS SOUTHWELL, F.Z.S.
Honorary Secretary to the Norfolk and Norwich Naturalists' Society.

THOSE who had the good fortune to visit the Gardens of the Zoological Society of London between the 6th of August and the 7th of September last, could not fail to be interested in an animal then exhibited for the first time alive in this country. I need hardly say, I refer to that strange animal the Manatee. So curious and interesting is the group to which this creature belongs, and so rapidly is it disappearing before the advance of civilization, that some account of its existing members will perhaps be acceptable to the readers of SCIENCE-GOSSIP; and I have been induced to add a brief summary of what is known of one other individual belonging to the same family,—Steller's Manatee, which has become extinct almost within the memory of man.

Once numerous on the face of the globe, as shown by the fossil remains of various genera and species found in the later Tertiary formations, the order Sirenia is now represented by two genera only, *Manatus* and *Halicore*; it was formerly regarded by naturalists as forming part of the order *Cetacea*, which they divided into two sections, one comprising the true Whales and Dolphins, termed *Zoophagous*, or animal-eating, the other, which included the *Manatee* and its kindred, they designated *Phytophagous* or plant-eating *Cetaceans*. A better acquaintance with the anatomy of the members of the group has proved that the resemblance to the *Cetacea* is almost entirely confined to external appearances, and that their organization indicates a close alliance to the great order *Ungulata*, or hoofed quadrupeds; but at the same time it is so peculiar as to constitute a small, but very distinct group, to which, from a fancied resemblance of its members to the fabulous *Siren*, or Mermaid, the name *Sirenia* has been given. The claim of any recent member of this order to a place in the British Fauna is very slight indeed, and rests entirely upon the occurrence of one or two specimens of the West Indian Manatee (*Manatus americanus*), which have been cast ashore, in a putrid condition, on the Orkney and Shetland islands, probably borne northward, after death, by the gulf-stream.

The existing members of this order are comprised in one family, the *Manatidæ*, which is

divided into two genera, *Manatus* aud *Halicore*, and numbers three, or perhaps four species; namely, *Manatus americanus* (*australis*), *Manatus senegalensis*, *Halicore dugong*, and perhaps, *Halicore tabernaculi;* but of the latter as a species very little is known. One other form has recently become extinct, namely *Rhytina Stelleri*, and the remains of others occur, as has already been said, in recent geological formations.

Dr. Gray, in the "Ann. and Mag. of Nat. Hist.," for Feb., 1865 (3rd series, vol. xv. p. 130), reviews the literature of the subject, and enumerates the remains of Manatees known to him; after a careful examination of which he arrives at the couclusion that there are two species of Manatee only, one confined to the American, the other to the African side of the Atlantic, both inhabiting the same latitudes, *i.e.* between 10° south and 25° north of the equator. The American species, *M. americanus* of Desm., includes, he considers, *M. australis* of Tilesius; *M. latirostris*, Harlam; and *M. fluviatilis*, Illiger; whilst to the African species *M. senegalensis*, of Desm., he refers *M. nasutus* of Wayman; *M. Vogelii*, Owen; and *M. Owenii*, Du Challu. To the former of these two species, *M. americanus*, the individuals which have been washed on the shores of the British isles are believed to have belonged. The habitat of this species is the eastern coast of inter-tropical America, the shores of the Caribbean Sea, and the Gulf of Mexico, with the West Indian islands. In these warm seas they were formerly found iu considerable numbers, always keeping near the coast and delighting in the shallow brackish water at the outlets of rivers, which they frequently ascended, and where the marine vegetable growth which formed their food was most abundant. The remarkable appearance of this species is described by Dampier, who had ample opportunities of making its acquaintance, with his usual truthfulness. "This creature," he says, in his "Voyage round the World, 1703," p. 33, "is about the bigness of a horse and 10 or 12 feet long. The mouth of it is like the mouth of a cow having great thick lips. The eyes are no bigger than a small pea, the ears are only two small holes, one on each side of the head. The biggest part of this creature is at the shoulders, where it hath two large fins, one on each side of its belly. Under each of these fins the female has a small dug to suckle her young. From the shoulders towards the tayl it retains its bigness for about a foot, then it groweth smaller and smaller to the very tayl, which is flat and about 14 inches broad, aud 20 inches long, and in the middle 4 or 5 inches thick, but about the edges of it not above 2 inches thick. From the head to the tayl it is round and smooth without any fin but those two before mentioned. I have heard that some have weighed above 1,200 lb., but I never saw any so large."

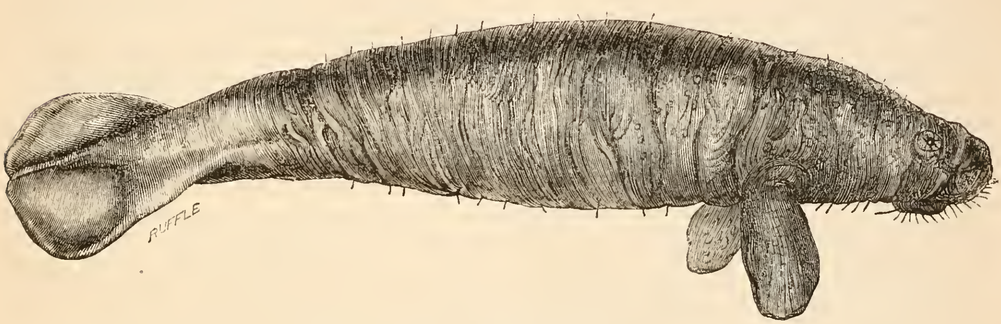

Fig. 27. Manatee (*Manatus americanus*).

To Dampier's description we may add that the snout is curiously truncated; the nostrils, which are placed at the upper terminal edge, are closed by valves; the mouth is small, the upper lip thick, aud the muzzle studded with strong hairs; the only permanent teeth are nine molars on each side of either jaw; two incisors are shed early, and the canines are altogether absent. The flippers, which are placed near the head, have their edges armed with rudimentary nails; the elbow-joint is conspicuous; of posterior limbs there is no external appearance, but a rudimentary pelvis is found embedded in the flesh. The tail is a continuation of the body, flattened horizontally, and somewhat resembling that of the beaver. The skin is very thick, of a dark grey colour when dry, dull black when wet, and scantily set with single hairs. A remarkable anatomical character, peculiar to this genus, is the presence of six cervical vertebræ only; in the closely allied genera *Halicore* and *Rhytina*, the normal number, seven, is present. The only representation of this species that I am acquainted

with of any value, is to be found in Dr. Murie's paper, which I shall have occasion to refer to shortly. It represents the young male which formed one of the subjects of his paper, and which, through the kindness of the Zoological Society, I am allowed to reproduce in the accompanying woodcut.

Of the habits of this species, Dampier gives an interesting account; he says it frequents creeks and rivers near the sea where the water is shoal and the shore low; sometimes being found in fresh water, sometimes in salt, but never far from the sea: its food consists of marine vegetables, and its flesh is excellent. "The tayl of a young cow is most esteemed, but, if old, both head and tayl are very tough: a calf that sucks is the most delicate meat." The natives in Dampier's time (1681) took great numbers of Manatees by means of a sort of harpoon lightly fixed in the end of a staff about 8 ft. long. After paddling quietly within striking distance, the harpoon was driven into the animal, and the staff withdrawn, leaving the harpoon (to which was attached a line 10 or 12 fathoms in length, terminating with a float,) fast in its body. The Manatee on being struck would swim away, but, impeded by the float, was soon overtaken; when quite exhausted by its efforts to escape, they drew it to the side of the canoe, and knocked it on the head; then towing the dead body to the shore, they made it fast, and returned to seek and kill another. Having secured a second Manatee, they towed it into shallow water as near the shore as possible, and its weight being too great to lift into the canoe, they "overset the canoa, laying one side close to the Manatee; then they roll it in, which brings the canoa up right again, and when they have heav'd out the water they fasten a line to the other Manatee that lieth afloat, and tow it after them. I have known two Moskito men," he adds, "for a week every day bring aboard two Manatees in this manner, the least of which hath not weighed less than 600 pound, and that in a very small canoa, that three Englishmen would scarce venture to go in." When a cow, accompanied by a young one, was struck, she generally took the young one under one of her flippers; but, if too large, the young one never left her, so that in either case it fell an easy prey.

Dr. Cunningham, writing to the Secretary of the Zoological Society, thus describes the habits of the Manatee in confinement:—"The specimen of the Manatee observed by me at Rio in 1867 and 1869 had been procured, as I was informed, from the Amazons, and was kept in a strip of artificial water in the *passao publico* (public gardens) of the city, which was tenanted also by two young jacares and a variety of water-fowl. It measured as nearly as I could calculate between 4 ft. and 5 ft. in length. In general it could only be recognised as an inky shadow moving along at some distance below the surface of the water. It evinced a curious predilection for the society of a white swan, following this bird, which was not at all alarmed by its associate, from place to place, so that we found that the presence of the swan on any particular spot on the water was a guide to that of the Manatee, or Cow-fish, as it is generally termed by the inhabitants of Rio. It was very tame, often protruding its curiously-fringed lips above the surface of the water to take bunches of grass from the hands of bystanders; and several times I observed it grazing on the short herbage at the sides of the water. This it accomplished by raising its head and shoulders above the surface, and maintaining itself in this position by means of one pectoral fin placed on the top of the low stone ledge or parapet which separated the water from the adjoining turf, while it slowly moved along sideways in this position cropping the grass as it went." (P.Z.S., 1870, p. 798.)

In a paper read before the Zoological Society in November, 1875, Professor Garrod, the prosector to the society, calls attention to the prehensile power possessed by the upper lip of the American Manatee. On either side the upper lip is to be found an oval prominence separated by a square interval, forming the anterior portion of the lip. In life these prominences, he says, "face inwards towards one another, and when the animal is feeding it grasps the food with them, by working them laterally inwards, so that the piece of vegetable under mastication is seized between them, and there held firmly by the coarse bristles with which they are covered. The pads diverge in relaxing." Mr. Garrod likens this action to the lateral movement of the mandibles of caterpillars whilst feeding on leaves, and states that he has not observed a lateral prehensile power of the upper lip resembling it in any other mammalian.

In 1866 an attempt was made to convey a young female Manatee alive to this country; it left Porto Rico on the 12th March, but lived only ten days at sea. In June of the same year, Herr A. Kappler, of Surinam, having secured a young male, taken in the Maroni river, a second attempt was made. Under the charge of Mr. Clarence Bartlett, this attempt proved all but successful; all went well till within two days' sail of Southampton, when the stranger suddenly succumbed to the chilling north-east wind which set in. These two specimens, which were carefully preserved, afforded the materials for Dr. Murie's splendid paper on the "Form and Structure of the Manatee," published in the Transactions of the Zoological Society for 1872; and the result of the experience thus acquired as to the best mode of conveyance, &c., led to the third attempt proving successful. A half-grown female Manatee, measuring 7 ft. 2 in., arrived safely at the Zoological Gardens on the 6th of August last (1875). It was sent from Pin Point, Demerara, by Mr. R. Swain; the tank in which it was conveyed being

slung upon a long pole in order to protect its occupant from injury arising from violent contact with the sides of its prison, brought about by the motion of the vessel. On being placed in the gardens, it soon became quite tame, and fed readily on lettuces and sliced vegetable marrows. This lasted till the 7th of September, when the animal died very suddenly; an examination of the body by Mr. Garrod, failing to discover the cause of death.

The remaining species of Manatee, *Manatus senegalensis*, has been found in the Senegal, the Gambia, and some of the rivers of Western Africa. Murray ("Geographical Distribution of the Mammals") says that its range extends round the Cape of Good Hope, and that it has been found as far north on the other side of the continent as Quillimane, in Mozambique. The skull of this species, according to Dr. Balfour Blaikie (P.Z.S., 1857, p. 30), differs from that of *M. americanus* in being more compact, the snout shorter, the lower jaw more angular, with its lower border more curved, and the zygomatic process of the temporal is less elevated. Its habits appear to be similar to those of the preceding species; frequenting the estuaries of rivers, it feeds on the marine vegetation there abounding; but as a species it is not nearly so well known as its American relative.

(*To be continued.*)

PHOTO-MICROGRAPHY.

By T. H. Powell.

THERE is a general impression that it is not easy to obtain a good negative when a photograph of a microscopic object is desired; and that the difficulties are in many cases great cannot be denied. There are many objects, however, which may be easily photographed; and the aim of this paper is to give simple and concise directions whereby this may be done.

A special photographic camera is not necessary, because, in focussing, the body of the microscope is moved, and not the focussing-glass. An ordinary camera, with lens removed, can therefore be used, with a piece of *very finely* ground glass fitting the frame carried by the dark slide, as a focussing-glass, held tightly in its place by springs so arranged that the glass can be removed readily before the sensitized plate is taken out of the bath; it being most essential that the sensitized plate should lie in exactly the same plane as the focussing-glass. Frames, measuring 4¼ by 3¾ in. or 5 by 4 in., will be found most handy, and should be well varnished, and great care taken to keep the wires clean. The microscope, placed on a table in a horizontal position, must be connected with the camera by a black velvet hood fitting round the tube of the microscope, and must be perfectly light-tight in every part. If the microscope be a binocular, the Wenham prism must be removed; and it is better to substitute for the eye-piece a brass tube, with a dead blacked interior extruding about a quarter of an inch from the end of the instrument, over which stops of various sizes may be fitted (easily made from pill-box lids, by punching round holes in them). A paraffine lamp can be used for illumination, and admits of two arrangements. It can either be placed at the side, and its light condensed on the mirror beneath the stage by a bull's-eye condenser, and thence reflected through the object up the microscope tube; or the mirror can be dispensed with altogether, the lamp placed so that the centre of its flame is in a line with the optical axis of the microscope, and a bull's-eye condenser placed between it and the stage at that distance which yields an intense well-diffused light. If a transparent object (*e.g.*, the proboscis of a blow-fly) be now placed upon the stage, its reflected image will be seen upon the focussing-glass; and this must be examined with a pocket-lens, till, by means of the fine adjustment, the sharpest possible image is obtained. An allowance must now be made for the over-correction of the objective by turning the slow adjustment, so that the objective is slightly brought away from the object. For an inch object-glass about one-third of a turn is required; the exact fraction of a turn can only be ascertained by experiment. For a quarter-inch object-glass the correction required is so slight that it is scarcely necessary.

Everything is now ready for taking the negative; for this the following solutions will be required.

A good bromo-iodized negative collodion (Mawson's answers admirably, and can be obtained anywhere).

Silver Bath.—Nitrate of silver, 1 oz.; distilled water, 14 oz.; nitrate of barium, 40 grains; dilute nitric acid sufficient to render *very slightly* acid. When all have dissolved, filter; and, before using the first time, leave a collodion-coated plate in it for half an hour.

Iron Developer.—Sulphate of iron, ¼ oz.; water, 8 oz.; filter when dissolved, and add glacial acetic acid, ¼ oz.; spirit of wine, ¾ oz.

Redeveloper.—No. 1. Pyrogallic acid, 5 grains; citric acid, 12 grains; distliled water, 1 oz. No. 2. Nitrate of silver, 10 grains; distilled water, 1 oz.

Clearing Solution.—Cyanide of potassium, 80 to 120 grains; distilled water, 10 oz. To be labelled "Poison."

The plate having had its edges roughened by drawing across the edges of another plate, is rendered chemically clean by scouring with a mixture of Tripoli powder one part, methylated spirit and liquid ammonia of each two parts, then washed under a tap till all trace of the mixture is removed, drained, dried, and well polished with a silk handkerchief; next held horizontally and the collodion

poured slowly upon one corner, the plate slightly inclined so that the liquid spreads over its upper surface, and then tilted up so that the surplus collodion drains off again into the bottle; when the collodion has just ceased to drop, the plate is placed upon a dipper and gently lowered without a pause into the nitrate of silver bath, moved up and down for a few seconds, then left at rest in the bath for about five minutes, when it may be carefully removed and stood on blotting-paper for half a minute to drain. (From the time the plate is coated with collodion till it is cleared all operations except exposure must be carried on in a dark room. A bull's-eye lantern with a piece of yellow glass substituted for the bull's-eye should be used to light the operator.)

The plate is next placed film downwards in the frame and the dark slide-door fastened; then the dark slide is carried into the room where the microscope has been arranged, slid into the camera, and the shutter drawn up. The length of exposure varies, and can only be ascertained by experiment; as a guide it may be roughly stated at from four to six minutes for an inch objective with a circle on the focussing-glass about three inches in diameter: with lower powers under the same conditions the time of course decreases. The time of exposure having elapsed, the dark slide is carried back into the dark room, the plate removed, held horizontally by a plate-holder, and enough of the iron developer to flood it poured quickly on; the liquid by a slight movement of the plate being kept in constant motion backwards and forwards, the image will appear, and when its detail looks perfect, hold the plate under a tap and allow a steady stream of water falling upon it to wash off all trace of the developer. Now hold the negative up to the light and examine its back with a pocket lens; if sharp in every point and no stains visible, the next step will be to intensify it.

Equal parts of the Redevelopers, No. 2 and No. 1, are poured into separate glasses; the plate flooded by the latter, which is then poured off into the glass containing the former, and the mixed solutions poured back on the plate; after a few seconds the liquid is poured off again into the glass and the negative examined; if the flame on the lantern can scarcely be seen through the blackest parts, the process must be stopped by washing thoroughly under the tap; but if this is not the case, the mixed redeveloper must be again poured on; and this must be repeated till the negative is sufficiently black, care being taken, however, not to repeat this too often, or "fogging" will be the result.

It now only remains to remove the undecomposed bromo-iodide of silver from the film; this is done by pouring the cyanide solution, which can be used again and again, on the plate; when cleared, it is again put under the tap, thoroughly washed, set aside to drain, and when perfectly dry gently and evenly warmed, a varnishing solution poured upon it just as described for the collodion; then when the varnish ceases to drop, it is held before a fire till a bright and hard surface has formed. The negative is now finished and ready to print from.

NOTES ON THE DIPTERA.—III.

The Muscidæ.

To but few persons, probably, does the name Muscidæ convey the idea of anything different from the house-fly, the blue-bottle, and the dung-fly. These three insects are so common as to need no description, but there are a great many species nearly, if not quite, as plentiful, whose existence is commonly ignored. The Muscidæ are by far the largest family of the Diptera, and even in the British islands, notwithstanding the smallness of their area, the number of species is countless; so that many are as yet undescribed and unnamed.

The Muscidæ differ widely from the Bombylidæ and Tabanidæ, described in our previous papers, being separated from them by many families. They are closely related to the Conopidæ, the Despunculidæ and the Œstridæ.

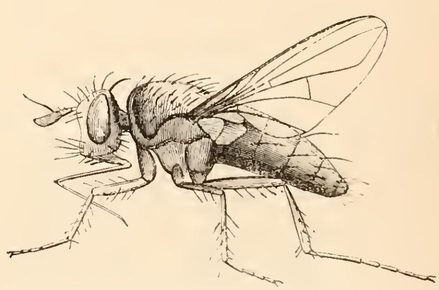

Fig. 28. *Bucentes geniculatus*, × 7 diam. The antenna, feet, and wing of one side only are represented.

In consequence of the great size of the family, it is divided into sub-families. These are arranged in two divisions—Calypteratæ and Acalypteratæ. These terms (derived from καλυπτήρ, a covering) refer to the form of the alula (*al*, fig. 30), which in the Calypteratæ is sufficiently large to cover the haltere, while in the Acalypteratæ the alula is so small as generally to leave the haltere altogether uncovered. The Calypteratæ are usually robust, and are more or less like the blow-fly and house-fly, which are the most familiar examples. The Acalypteratæ are mostly slender, and the dung-fly is a good type of them.

We will first notice a few of the Calypteratæ, and begin with a common little fly, named *Bucentes geniculatus*, belonging to the sub-family Tachinides.

It is found almost everywhere during spring, summer, and autumn, but owing to its very ordinary appearance, it usually passes unnoticed. It is variable in size, being sometimes nearly as large as a house-fly, but oftener only half the size. It is of a bright brown colour, covered with long black bristles, and has large wings. The head, too, is large; and the face, which is yellowish-white, is somewhat swollen. The antennæ are prominent, and of a rather unusual shape; but the most characteristic feature, the one by which the fly may be recognized immediately, is the mouth. A drawing of the insect is given at fig. 28, which shows the

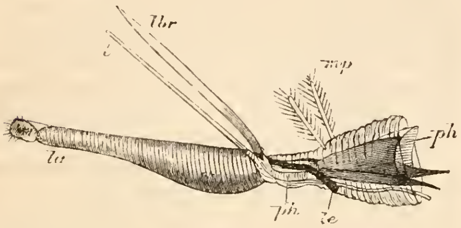

Fig. 29. Mouth of *Stomoxys calcitrans*, × 14 diam.: *ph*, *ph*, pharynx; *lbr*, labrum; *l*, lingua; *la*, labium; *mp*, maxillary palpi; *le*, levers or fulcra of labrum.

long proboscis. It is only the labrum or lower lip which is so developed in length; all the other organs are very short. It is apparently jointed in the middle; but the part beyond the bend is really the sucking part, *i.e.* the lobes of the labrum, enormously lengthened, which, just as in all other flies,

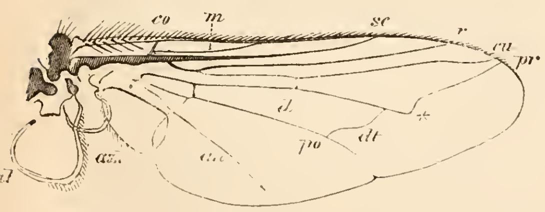

Fig. 30. Wing of *Tachina virgo*, × 5½ diams. Names of veins:—*co*, costal; *sc*, sub-costal; *m*, mediastinal; *r*, radial; *cu*, cubital; *pr*, præbrachial; *po*, post-brachial; *an*, anal; *dt*, discal-transverse; *d*, discoidal areolet; *axl*, axillary lobe; *al*, alula.

are capable of being folded back under the head: the specific name *geniculatus*, "having a knee," refers to this folding back. This very peculiar form of mouth shows the relation of the fly to some members of the family Conopidæ, which have similar mouths.

The next two insects chosen for description belong to the sub-family Muscides. During the warmer half of the year, a remarkable fly may often be seen on trunks of trees, hedges, umbelliferous flowers, and other places where flies congregate. Its colouring is simple, but exceedingly striking: the body is of a very dark steel-blue—almost black, smooth and lustrous; the wings are grey at the tip, and brilliant orange at the base and along the fore border for about half their length. The face is of a yet more brilliant and golden colour than the wings. The bright orange, so well set off by the deep colour of the body, gives the fly its beauty, and makes it much more handsome than the Blue-bottle, which it resembles in shape and size. This fine insect is known as *Musca meridiana*; and, as its name tells, it is only to be met with during the most sunny part of the day.

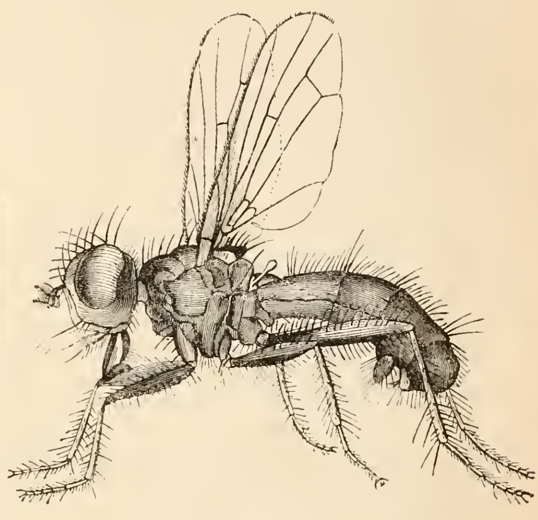

Fig. 31. *Cordylura pubera*, × 7 diam.

The mouths of the Muscidæ are all interesting, but that of *M. meridiana* is pre-eminently so. It is short and thick, and the sucking part of the labrum (*i.e.* the part often erroneously called "the lips") is enormously broad, in great contrast to the mouth of *Bucentes*. The capillary channels are large and numerous, and the whole mouth is hairy. It is also remarkable for possessing two little papillæ, which appear to be the rudiments of missing organs,—labial palpi, perhaps.

Our next fly, *Stomoxys calcitrans*, is common from April to October, and especially so in the late summer and autumn. It greatly resembles, in external features, the common house-fly, but it is unlike it in one or two important points which we will briefly notice. The name *Stomoxys calcitrans* is most appropriate: the former word signifies "sharp-mouth," referring to the structure of that organ, the latter "spurring," in allusion to its use. Fig. 29 shows the mouth, which is remarkable for this, that whereas most biting flies use only the labrum and maxillæ for piercing, this fly bites with the labrum

also, and this is modified for the purpose. Instead of being soft, and terminating in still softer lobes, it is hard and stiff throughout, and covered with transverse striæ, and many specimens have large sharp teeth at the tip. In others, however, the teeth are small (as in the drawing, where they can hardly be seen), and in some absent. These teeth are found in all flies of the genus *Musca*, and are very large in *M. meridiana*. They are supposed to be used for grinding hard substances. The labrum and lingua are long, but slender. *Stomoxys calcitrans* abounds, not only in the country, but in towns, and even in London. It sucks the blood of horses and cattle, and causes them much irritation; but its bite is not poisonous, and leaves no painful swelling like the bite of the Tabanidæ. Though this genus belongs to the same sub-family as the previous, it is more nearly allied to the Conopidæ, for its mouth greatly resembles the mouths of the genus *Conops*, while the wings also are somewhat alike; there are several species and varieties of Stomoxys; but it is difficult to distinguish them.

The two principal types of wings in the Muscidæ are shown by fig. 30, wing of *Tachina virgo*, and by the Cordylura's wing in fig. 31. In the wing of Tachina, it will be seen that the præbrachial vein (*pr*) is bent at a sharp angle at *, and reaches the edge of the margin close beneath the cubital, while the discal transverse vein (*dt*) is curved: this is the most frequent form in the Calypteratæ. In the Cordylura's wing, on the other hand, the præbrachial vein is continued straight to the edge, and the discal transverse is straight too: this form is commoner in the Acalypteratæ, but occurs also in some of the Calypteratæ. There are other less important types and intermediate forms, one of which occurs in *M. meridiana, S. calcitrans, and B. geniculatus*, and may be seen in fig. 28: in this type the præbrachial is curved upwards, but not sharply bent.

It will be well to notice here that some of the smaller veins which occur in the wings of many other families are absent from the wings of the Muscidæ, though the principal veins (which are named in the Tachina's wing, fiig. 30) are the same in this as in other families. Also that, in consequence of the areolets or interspaces near the base of the wing being contracted into a very small compass, the wing is chiefly occupied by the large areolets near the tip, while the discoidal areolet is protracted to such a length as to almost forfeit its claim to be called "disk-like." This may be understood by comparing these wings vein for vein with those of Bombylius and Tabanus, given in our former papers (April 1875, p. 80, and July 1875, p. 148).

We will now proceed to the Acalypteratæ, and begin with the sub-family Helomyzides (from ἕλος, a marsh, and μυῖα, a fly,—flies inhabiting marshy ground), which is closely related to the Calypteratæ and also to the family Conopidae. The first genus is Cordylura; it includes several species, the most common being *C. pubera*, represented by fig. 31, which is frequently met with near rivers and sluggish streams. It is about the size of the common dung-fly, and not unlike it in shape, but differs from it in several particulars. The colour of the body and head is dark brown, and it is thinly covered with black bristles. The head is large, the face whitish, and the eyes of the colour known as Indian red. The antennæ are black, and their bristles fringed. The mouth is of the type common to the Muscidæ; the palpi are black, and have an exceedingly long bristle at the tip: this is characteristic of the genus Cordylura. The wings are colourless, and their veins yellow; the femora are brown and the rest of the leg yellow, with black spots on the tarsi; but the most distinctive feature is the abdomen of the male, which is long and slender, curved downwards and thickened at the tip, with *a wart-like protuberance on the under side* (see fig. 31). It is on this account that the genus is named Cordylura, from κορδύλη, a bump, and οὐρά, a tail. The *tout ensemble* of the male is so like some of the members of the Conopidæ, that we have made a drawing of it, to aid in its identification and for comparison with the Conopidæ, about which we purpose at some time to write.

F. J. Allen and H. M. J. Underhill.

NOTES ON THE AQUARIUM.

"W. H." is right in thinking "double anemones very unusual." After aquarium-keeping for more than a dozen years, and paying special attention to sea-anemones, I have never seen more than two, which were born and reared in my slate tank. Both were specimens of the common Daisy (*Sagartia bellis*), and belonged not only to the same variety, but the same family, probably the same mother, who has been in my possession some fifteen years, this stock being specially strong, hardy, and prolific; for, whilst many other individuals have succumbed to various vicissitudes, at different times, and one whole family of pink-disked daisies died out entirely, to my great grief, this robust set live on and multiply to the third and fourth generation, enough to have peopled a hundred such tanks, if all the offspring could have found suitable food, care, and accommodation.

The first Double Daisy lived two or three years, and attained the height of two inches, and died during my absence from home in June, 1875. I believe it died of spring cleaning, or rather of paint,—the outside of the window in which the tank stood was painted. This most valuable anemone was the first to fall a victim; having taken up its position almost half out of water, it was probably more easily affected by the paint-poisoned atmo-

sphere, whilst the other anemones more deeply settled in the water survived. I have found paint and varnish most injurious to aquarium animals. Therefore it behoves all aquarium possessors to take special care of delicate specimens at such times and seasons when paint and its attendant evils are inevitable. If a shiny coating of scum from paint or varnish be allowed to accumulate on the surface of the water and hinder the free passage of air, the effects are almost sure to be fatal. To prevent this, when neither the aquarium 'or specimens can be removed, I have found it best to keep the aquarium closely covered, but to give an extra dose of oxygen, in the shape of more constant artificial aëration, as, *e.g.*, by syringing or briskly stirring with a stick, when a constant current is not available; also to place open pans of water in the room to receive the paint poison instead of the tank. Therefore in aquarium-construction it is well to avoid paint wherever possible; and hence also the enormous advantage of *a continuous circulation* of water, because impurities from *without* as well as from *within* have not time to accumulate in one place, but are dispersed before they work evil.

The question of atmospheric contamination is an important one, and has been discussed by the Natural History and Microscopical Society at Birmingham, with reference to the probable injurious effects of their tainted atmosphere on the proposed aquarium in their murky town. Individual experience on this point would be valuable. Can any one bring it to bear?

After grieving over the untimely end of my first Double Daisy, one day in July I was delighted to find another double baby, so tiny it was not easy to *see* its two mouths, much more *feed* them. But patience and frequent food conquered; although she once wandered without leave, lost herself, and got nearly starved. She now keeps a promising situation, and sometimes stands nearly an inch high, expanding $\frac{3}{4}$ in., each disk measuring $\frac{3}{8}$ in. respectively. Both specimens resembled each other closely in colour and all else, bearing decided marks of the same parentage. The column is united throughout, showing merely a slight line or depression where the bodies unite. Two perfect disks expand on the top, with duplicate sets of tentacles, and are set side by side, not "developing out of the side," as with "W. H.'s" "Double Plumose Anemone." The digestive organs appear to be distinct, yet connected; if one head is fed, the other is nourished; if one half is probed, the other shrinks in concert. I have noticed this sympathetic action in our English corals, *Balanophyllia regia* and *Caryophyllia Smithii*, whose corallums appear still more distinct, and yet are united. I have four double specimens standing side by side, looking like separate individuals, growing out of the rock; two others are more closely united, but all shrink and expand simultaneously, showing intimate connection. I believe these double corals are rare, though P. H. Gosse has figured one compound specimen of *C. Smithii* with four disks and sets of tentacles. I should be glad to hear of other instances. These examples of single animals, with occasional compound variations, are extremely interesting, as showing connection with other genera, and the gradual diminution of species, as our knowledge advances.

On taking up SCIENCE-GOSSIP, after some years' cessation, two things strike me forcibly. 1st. The many unconscious contributions to Darwinism. 2nd. The want of standard knowledge on aquarium matters generally.

Whilst Darwin's theory of natural selection is daily gaining ground, the practice of aquarium-keeping seems to have advanced very little, if at all; and certainly appears not to keep up with the times.* Exploded theories and practices are again and again recommended, canvassed, and carried out, and with the usual disastrous results.

One loses his Warty Newts through a heavy shower of rain, causing the aquarium to overflow. Another wants to know whether it is possible to keep "Pope-fish" in confinement, and complains that they persist in dying, although there is "plenty of water, which is *frequently changed*." With the best possible intentions, another recommends the introduction of growing red and green sea-weed, and the *regular supply of salt-water* and animals, from fishing-boats that discharge weekly at Billingsgate. Others want to know *why* fresh-water fish, tadpoles, &c., become "covered with a downy white substance, or fungus," and die a horrible death, and what is the *cause* of this "horrid pest" in the aquarium?

All these things imply a constant, or periodic change of water, totally at variance with the teachings of the best-regulated aquaria.

If your correspondent "H. C. C. M." will tell me whether he changes his water, and if his rock-work reaches above the surface, I may be able to help him rear his tadpoles healthily from the egg to maturity, and to avoid the fungoid growth for the future. Most probably this very *change of water* is one of the primary causes of fatality. It is never necessary to change the water in a well-regulated aquarium. The first supply should be the last, unless accident and unforeseen causes arise.

Stocking is, therefore, not so difficult a thing as G. H. Webb implies. It is difficult to get, transmit, and keep rare and delicate aquarium animals,

* It should be understood that these remarks refer to the *private* aquarium-keepers, who ventilate their difficulties in SCIENCE-GOSSIP, without eliciting higher information in response, and not to the enormous strides made in *public* aquarium-keeping, as, *e.g.*, at the Crystal Palace, and all others built and managed on the same principle.

but it is comparatively easy to procure and maintain the more hardy ones, and to lay in a stock of water *once*, instead of *weekly*. I can give the addresses of eight trained aquarium-collectors who can supply these things, and it is generally much better to depend upon them than upon ordinary fishermen, whose business it is to supply dead fish, and therefore cannot be supposed to understand the management of living ones.

I am glad to see in January Science-Gossip a notice of Mr. Hughes's half-crown book, on the management of marine aquaria. This paper is an advance upon most old aquarium works,—even if he is wrong upon one point,—his favourite one; but when information is to be had from accepted authorities, who are right upon all points, it is like waste power not to use it. We have not time and opportunity each to work out things for ourselves; when this is done for us, shown to be right, the results clearly demonstrated, printed and published at small cost, it seems a pity to go wrong, and cause needless suffering to harmless animals under our care. It is sad to "sin in light." I know that competent teachers are wanted, and that much remains to be learnt; but I think that the extra trouble and expense of aquarium-keeping might be greatly reduced by taking intelligent hold of experience already gained, and following accepted principles, proved such by the most satisfactory results, and laid down by those most competent to form an opinion.

I much appreciate the manner in which your correspondents have graciously accorded information on the development of newts, in response to my question in answer to G. M. Doe, on the "Spawn of frogs and toads." It is surprising that an "eminent naturalist" should teach the popular fallacy that tadpoles drop their tails when no longer needed. A lady corroborates the idea that the tails are absorbed, and do *not* tumble off; she never found them tumble off, but often watched them growing gradually shorter.

I conclude the experience of "H. E. G.," that newts' eggs are "disposed in small lumps, and frequently covered with clay, leaves, and earth," must be the exception; since J. Fullager and others have seen them laid singly, and doubled up in the leaves of aquatic plants. Is he sure the eggs referred to belonged to the Newt (*Triton*)? I have since had access to that beautifully illustrated and carefully-written volume, "Bell's British Reptiles," published in 1839, and find it considered the best treatise on the subject. He says newts' eggs are laid separately on aquatic leaves, at intervals during many weeks. Frogs' spawn is in lumps, and develops rapidly; toads' is in strings, consisting of a *double row of eggs arranged alternately*.

The "mistake" alluded to recently by F. Maingay, in "H. E. F.'s" remarks on tadpoles, in our last, evidently arises from a misprint or slip. If in Science-Gossip for December, p. 280, line 8 from top, the word *frog* be substituted for "newt," the sense is made perfectly clear, and consistent with the rest of the text. Each reader can easily correct his own copy, and prevent further mistake.

Will "H. C. C. M." give the date of year and month when he found frog spawn a week earlier than usual?

If people are wishing to study this most interesting development of tadpoles for themselves, I would recommend them *at once* to provide suitable accommodation, by preparing the tank or glass beforehand; taking special care to place some portion of the sand or rockwork above water, for the tiny breathers to disport upon. Shade the glass from the beginning: this will prevent the growth of excessive vegetation, but allow time for a less rampant crop of spontaneous vegetation, which is the best sort to supply oxygen for the animals to breathe. It would take too long here to explain why it is undesirable to transplant growing plants into aquaria, but as amphibians are not proper aquarium animals *per se*, it is quite right to introduce such vegetation as would be otherwise unlawful, especially as young tadpoles begin their lives as vegetarians, and leaves are required for food, as well as for the safe deposition of eggs. Therefore eventually get such plants as are recommended by James Fullager, in Science-Gossip for May, 1874, p. 104,—*Anacharis alsinastrum*, *Callitriche verna*, &c., or *Vallisneria spiralis*, which coming originally from warmer climates, bears forcing all the year round. In March or April, look for the spawn, and make careful observations and drawings whenever possible, and give Science-Gossip the benefit. The drawings in "Bell's British Reptiles" are worthy of emulation, bearing evidence of extreme care and exactness.

George Mivart's three-shilling book on "The Common Frog" (Nature Series), I have not yet seen, but imagine it contains information that would be interesting to many of us. It would be well to read what he says, and make comparative notes on time, temperature, and conditions of existence, as bearing on special developments.

"Trust him little who praises all; him less who censures all; him least who is indifferent to all," says a philosopher. I take this to mean, we may trust him most who takes earnest pains with anything, for,

"He would gladly learn and gladly teach."

G. S.

"When the short life of the Worker-bee is ended, we are sure the creature has had a pleasurable existence, that her labours have been of love, and that to her work has been that which we call happiness."—*S. Wood's* "Dwellers in our Gardens."

MICROSCOPY.

American Microscopy.—At the annual meeting of the American Microscopical Society of the city of New York, held Tuesday evening, January 25th, 1876, the following officers were elected for the ensuing year:—President, John B. Rich, M.D.; Vice-President, Wm. H. Atkinson, M.D.; Secretary, C. F. Cox; Treasurer, T. d'Orémieulx; Curator, O. G. Mason.

A Simple Section-machine.—Those who work with the microscope well know the advantage of possessing some kind of machine for cutting thin sections of various substances, and in order to aid those whose purses are not overstocked, I send drawing (half-size) and description of a simple little instrument, which can be constructed by any one possessing the tools and a little mechanical ability,

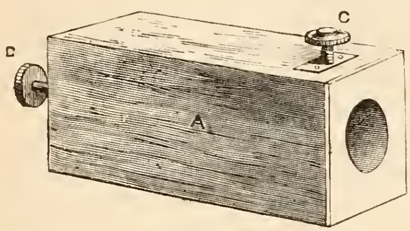

Fig. 32. Simple Section-cutting Machine.

or, where time is an object, purchased for a small sum (see advertisement). By referring to the sketch, it will be seen that the principle of action is a very ordinary one, the form only being reduced to the simplest possible. It consists of a slip of mahogany, A, faced with a stout plate of brass made perfectly flat. Previously to fixing this plate, a hole about ⅝ in. must be bored exactly in the centre of the wood, and extending to within about ⅜ in. from the opposite end; this done, the plate may be fastened on, and when all the edges are filled quite flush with the wood it will present a very neat and finished appearance. The milled-headed screw, B, works against a piston sliding in the interior, and that at C steadies and compresses the sheet while being cut; both work in thick slips of brass let into the wood and securely fastened. I have cut some very beautiful sections with this instrument, and have never come across anything of the kind so efficient and yet so easy of construction.—*J. H. Barton.*

Gold-size.—I would ask "J. R. T.," if successive layers of gold-size ever do dry, or at least, if the last applied coat does not soften again those beneath? I have had slides remaining perfectly sound for many years, but then, from some cause, the fluid has evaporated, and the gold-size has taken its place. I venture to suggest this after an experience of thirty years, and having prepared in that period some thousands of slides.—*S. L. B.*

"Water-glass."—Can any of the readers of Science-Gossip give me their experience in the use of silicate of soda—"water-glass," as it is sometimes called—as a medium for the mounting of algæ, desmids, &c.? What is the mode of procedure, and where can it be obtained? I have tried at the chemists' without success.—*St. T. H.*

Cement for Glycerine Mounting.—Having received several inquiries respecting this cement, I subjoin the following directions for its preparation and use:—White lead in powder, red ditto in ditto, litharge in ditto,—equal parts of each. These are ground together with a little turpentine until thoroughly incorporated, then mix with gold-size. The mixture should be sufficiently thin to work with the brush; it is perhaps scarcely necessary to say that the edge of cover and slide should be free from moisture before applying the cement, and the first coat allowed to dry before putting on a second. The last can be applied somewhat thickly, or, as the japanners say, floated on. No more of the cement should be made than is required for present use, as it soon sets and becomes unworkable. To save the trouble of grinding, a stock of the mixture can be kept ready ground in a bottle.—*F. K.*

ZOOLOGY.

Abundance of Sphinx Convolvuli.—There was quite a commotion in entomological circles caused by the appearance of this grand hawk-moth all over the country in the autumn of 1875, and of course there are plenty of theories afloat to account for this phenomenon. Against the theory that the moths have travelled here from the Continent, we must set the fact that many specimens have turned up far inland, and also that larvæ and pupæ were taken in some places ere the moths were captured. One of the most extraordinary circumstances in the history of the species is the occurrence of so large a preponderance of barren females amongst the September specimens, nor does it appear that any eggs are deposited in the autumn. Where, then, do the moths live during the winter? Or, do a small number of foreigners make their way across to us in the spring of certain years, and lay eggs in Britain, from which are produced these singular autumn flights? But then it is odd that none are netted, or even seen in the spring by some one or other of our hundreds of entomologists. Very probably, we frequently fail to detect the larva owing to its habit of concealing itself by day, actually retiring, as it is said, below the surface of the earth; and though there are entomologists who

go out by night after larvæ, few perhaps examine the Convolvulus. Beside a market-garden, near Putney, some years ago, I saw evident tokens of the presence of one or more *S. convolvuli* in bitten leaves and large grass, where there was a bank of wild convolvulus. A search, however, proved fruitless, and I could not visit the spot after dusk.—*J. R. S. C.*.

NESTS OF THE BROWN-TAIL MOTH (*Liparis chrysorrhœa*).—I have already chronicled in this journal some particulars regarding the habits of this moth while in the larval state. On further examination of a host of nests, I feel fully convinced that a nest seldom or never represents an entire family descended from one parent, the number varying greatly, though from fifty to seventy individuals may represent the average. Here and there a small colony of not more than a dozen or so may be found. After the larvæ have ceased eating, and "made up" their nests as winter quarters with a thicker coating of silk, they will still emerge to sun themselves outside on a fine day; and as I have detected nests with their quondam occupants dead and stiff on the exterior, they are sometimes surprised by a sudden change of temperature. Soon after their emergence from the eggs, the larvæ of *L. chrysorrhœa* use the furry padding which had encircled them previously to form a part of the nest, and so diminish the outlay of silk required then.—*J. R. S. C.*

THE OCTOPUS.—A capital little monograph, written by Mr. Henry Lee, F.L.S., on this interesting cephalopod, has recently been published by Messrs. Chapman & Hall. Mr. Lee is one of the most attractive of popular writers on natural history, and here we find him comparing the "Devil-fish" of fiction with that of fact. Naturalists will be glad of the full information as to the breeding, spawning, and general habits of the Octopus, which Mr. Lee's position as naturalist to the Brighton Aquarium has enabled him to note. Observations on all our British cuttle-fishes are included in this volume.

VARIETY OF THE HOUSE-SPARROW.—Those who take interest in noticing the appearance of varieties of zoological specimens will probably be glad to add another instance to their stock, viz., an uncommon variety of that common bird *Passer domesticus*, the common house-sparrow, as during the past cold weather I had the pleasure of observing, at the distance of about four yards only, a perfectly *black* sparrow. It was amongst numerous other sparrows, and was not by any means one of those "dingy brown" specimens which assume that hue (as Wood says) from living in the neighbourhood of towns, but a bird of a deep ebony-black uniformly all over its body. On my nearing it, it flew on to the ledge of a chapel close by, but not before I had had ample time to observe it. On going home I referred to Morris's "British Birds," to see if he mentioned a black variety of the sparrow, but he does not do so; the nearest colour to black that he mentions amongst the varieties is a blackish-brown.—*C. H.*

THE "DEMOISELLE CRANE" (*Anthropoides virgo*).—A bird of this species was recently picked up dead on the banks of the river Cale in this neighbourhood.—*Wm. Herridge, Wincanton.*

THE BUTCHER-BIRD.—In the January number of SCIENCE-GOSSIP, E. Lovett seems to have a doubt about butcher-birds impaling their victims on thorns; but it is quite true that they do so, as I have witnessed. When going down a lane one summer, I was attracted to a bush by the sound of a very noisy bird, which then flew to a tree close by. It proved to be some species of butcher-bird, for on examining the bush I found a field mouse stuck on a stout thorn, and on returning some hours afterwards, I saw that half of it had been devoured. —*Wm. Herridge, Wincanton.*

PARASITIC WORMS IN FISH.—As the article contributed to SCIENCE-GOSSIP for January, by Mr. W. W. Wilson, is calculated to produce unnecessary alarm in those who are fond of fish, I must crave space for a few remarks. The nematode worms (not hæmatoid), which are so called from their thread-like form, abound in fish, and Van Beneden states that there are few, either from fresh or salt water, which do not contain in the folds of the peritoneum, especially about the liver, cysts full of these worms. Young rays as well as turbots, as soon as they are hatched, have their digestive organs literally stuffed with parasitical worms. This is not, however, necessarily a symptom of disease; and as almost every animal has one or more parasites, to which it stands in the relation of a natural *host*, it is more than probable that they play a useful part in the vital economy. It has even been suggested that as leeches, another order of parasites, have been advantageously used, practitioners may, hereafter, be induced to prescribe, in certain diseases, doses of intestinal worms! Few, if any of these parasites, pass their whole life in the body of a single individual. The worms described by Mr. Hughes were apparently in their perfect state. They would produce eggs, which would have been discharged with the excreta into the sea, if the fish had been free, where they would "bide their time," till they found a lodging in some other smaller fish, in which they would pass into the encysted form similar to the chrysalis of an insect. These in turn would be swallowed, together with their host, by a larger fish, which in this case was the "Goldswing," or the cysts may have found their way into the salt water supplied to the

aquarium, for they retain their vitality for an indefinite period, while waiting for a suitable host. Each parasite appears to have its peculiar host, and can live and pass into the perfect state in no other which is not closely allied to it. Thus the *Ascaris mystæ*, the guest of the domestic cat, lives in different species of *Felis;* while the fox, so similar in appearance to the wolf and the dog, cannot develop the *Tænia serrata*, so common in the latter animal. This fact may allay any fears excited by your correspondent's communication. It is extremely improbable (I may say impossible) that the eggs of a nematode peculiar to a cold-blooded fish should find a congenial habitat in the stomach of a man.—*J. P., Maidenhead.*

BOTANY.

The Juniper.—The friend of T. C., who supposes that this pretty shrub "grows wild" in Sussex, *only near Steyning*, is in error, as may be observed from Mr. Hemsley's note thereon, "Abundant on the Downs westward, but very rare east of Brighton." It is not inserted in Mr. Roper's excellent Flora of Eastbourne, which endorses the above; but any climber of our Downs in the direction of Hampshire will meet with it in plenty, with abundance of berries. On the hills around Kingley Vale, it luxuriates, and upon it, on our Downs, last year occurred the orange *Podisoma juniperi*. H. E. Wilkinson has a difficulty with respect to the height of *J. communis*, and I would take this opportunity of *a gossip*, although only partly *in re*. In the December number of the *Journal of Botany*, my assertion that *Cladium mariscus* grew at Aruudel was doubted; but he kindly and unexpectedly removes all doubt by these words: "I gathered the plant last autumn from the banks of the lake in Arundel Park, Sussex." The question as to the height attained by *J. communis*, I can only thus answer. Syme says it varies from 2 to 4 ft., but he certainly underrates its growth. When exposed to the winds it is apt to become stunted, but in lower and sheltered situations it may be found here from 5 to 6 ft. high.—*F. H. Arnold, Fishbourne, Chichester.*

Local Names of Plants.—Allow me to add to the list of local names of plants which have lately appeared in Science-Gossip, the very strange name given in Cumberland to the earth-nut (*Bunium flexuosum*). It is called a "yowe yorlin." Why, I cannot tell. Yowe is the vulgar pronunciation of ewe. But I am not aware of yorlin being ever used otherwise, either singly or in combination. The nearest word in sound is "gorlin" a little naked object, as an unfledged young bird, but neither of these names has any connection with the plant. I may add also the Cumberland name of *Bistorta major*, "Easter magianty." This, I think, is not, as some say, from the French word *manger*, to eat, as meaning something to be eaten at Easter. It is rather a gross corruption of the scientific name. People not knowing the meaning of *bistorta* or *major* have called the former Easter, and the latter magianty. Let me add that the usual meaning given to *Aquilegia* the columbine, is probably a mistake. It is said to be from *aquila* an eagle; but then the latter half of the word is left out altogether. Is it not from *aqua*, water, and *lego*, to collect, from the little globules of dew or rain so conspicuous on the leaves of the plant?—*R. W.*

Centaurea solstitialis.—Dr. Morton asks in the last number of Science-Gossip to be informed in what locality this is an established plant. I do not think it will be found to be so anywhere in England: it is a native of the south of Europe. It is occasionally found in the neighbourhood of Brighton, here and there a single plant, generally in lucern. In Grenier and Godron's "Flora of France," it is said to "infest the fields in the south, found (*se retrouve*) in the north, but exclusively in fields of lucern." I am led to suppose, therefore, that the seeds of the plant are brought from the south of France mixed with those of lucern; and flowering here from July till September, it is cut with the autumn crop, and prevented from ripening its seeds, even if it would otherwise do so in this climate, which it probably would not; and being an annual, the plant would not spring up again. I have occasionally met with it by the roadside at Nice, and along the coast from there to Marseilles in July and August; Hooker mentions it with an asterisk, to show that it is not a native of this country, and that it *no longer exists in given localities.*—*T. B. W., Brighton.*

The Colours of Spring Flowers.—Some interesting observations on the flowering of spring plants have just been made at the meeting of the Edinburgh Botanical Society by the Vice-president, Mr. Buchan, who, with a view of discovering what may be learned from the budding, leafing, and flowering of plants and trees, has collected the following information on the subject:—It appears from the result of noting the average dates of flowering of 32 species at the Royal Botanical Gardens during 26 years, that the six latest springs were—1855, when the flowering was 30 days later than the average; 1870, when flowering was 16 days; 1853, 14 days; 1856, 13 days; 1857 and 1865, each 12 days later. The five earliest springs were 1874, when flowering was 23 days earlier than the average date; 1869, when it was 19 days; 1851, 13 days; and 1858 and 1866, each 11 days earlier. The two extremes show a difference between the dates of flowering in different years of fifty-three days. The longest deviations from the average were before the

equinox. As to the relations which these effects have to temperature, it was found that the mean temperature of Edinburgh fell to its lowest on the 11th of January, when it was 34·8°, and from this point it may be assumed that meteorological conditions commence which result in giving vegetation a start. Another question of great interest is the relation of the colour of flowers to their date of flowering. Taking 909 species of British flora, 257 were found to have white flowers, 238 yellow, 144 red, 94 purple, 87 blue, the remainder being green and other colours. Of the blue flowers, 16 per cent. bloomed in April; 14 per cent. of the white flowers bloomed in that month, but only 9 per cent. of the reds, the yellows being very close to the latter. It thus appeared that the blues were far ahead of the reds and yellows, the whites being intermediate, and the purples and greens came in between the blues and the reds. This indicates the existence of some general law which arranges the flowering of plants in the British flora according to the colours in the spectrum.

GEOLOGY.

How Anglesey became an Island.—The above is the title of a most interesting paper by Professor A. C. Ramsay, F.R.S. The author described and illustrated by sections drawn to scale the contours of the island of Anglesey and the adjacent parts of Carnarvonshire, and noticed that the whole island may be regarded as a gritty undulating plain, the higher parts of which attain an average elevation of from 200 to 300 feet above the sea-level. Similar conditions are presented by the country for some miles on the other side of the Straits, and in both the general trend of the valleys is north-east and south-west. The rock surfaces, when bare, show glacial striæ running generally in a direction 30° to 40° west of south. The Professor indicated that the great upheavals of the crust of the earth forming mountains took place long before the commencement of the Glacial epoch, and that ordinary agents of denudation had ample time for the formation in mountain regions of deep valleys, down which, during the Glacial epoch, glaciers would take their course. He noticed the evidence of this local glaciation furnished by the striation of the Welsh mountains, from which he inferred that these mountains as a whole were not overridden by a great ice-sheet coming from the north, and he described the course of the glaciers flowing from the north-west slopes of Snowdonia as being in the directions west-north-west, and north. These glaciers, however, did not reach the region now occupied by the Menai Straits, but spread out in broad fans on the north-western slopes of the hills now overlooking the Straits, a fact indicated by the directions of the glacial striæ in these parts. Anglesey, therefore, was not glaciated by ice-masses coming from Snowdonia; and as the striations on that island point directly towards the mountains of Cumberland, the Professor inferred that these markings were produced by a great ice-flow coming from that region, reinforced probably by ice-streams from the north of Scotland, and which were large and powerful enough to prevent the glaciers of Llauberis and Nantffrancon from encroaching on the territory of Anglesey. Professor Ramsay described the rocks bordering the Straits as consisting of nearly horizontal carboniferous strata, which, from appearances, must once have filled the whole of the region now occupied by the Straits. He considered that the softer shaly, sandy, and marly beds, remains of some of which are still to be seen on the coast, were swept away by the action of the great glacier coming from the north-east, forming a valley now occupied by the sea; and in support of this view he cited the valley of Malldraeth Marsh, running across Anglesey, parallel to that of the Menai Straits, about four miles to the north-west, which a very slight change in conditions would convert into a ford, differing from the Straits only in being closed at the north-east end.

On some Unicellular Algæ Parasitic within Silurian and Tertiary Corals, with a Notice of their Presence in *Calceola sandalina* and other Fossils.—This was the title of a paper recently read before the Geological Society, by Prof. P. Martin Duncan, F.R.S. After noticing the works of Quekett, Rose, Wedl, and Kölliker, which refer to the existence of minute parasitic borings in recent corals, recent shells, and a few fossil mollusca, the author describes the appearance presented by a great system of branching canals of about 0·003 millim. in diameter, in a Thamnastræan from the Lower Cainozoic of Tasmania. He then proceeds to examine the corresponding tubes in *Goniophyllum pyramidale* from the Upper Silurian formation. In sections of that coral one set of tubes runs far into the hard structure; these are straight, cylindrical, and contain the remains of vegetable matter. Neither these tubes, nor any others of the same parasite, have a proper wall: they are simply excavations, the filiform alga replacing the organic and calcareous matter abstracted. In some places the dark carbonaceous matter is absent, and the lumen of the tube is distinguishable by the ready passage of transmitted light. Other tubes run parallel to the wall, and enter by openings not larger than their common calibre. But there are others which have a larger diameter, and in which the cytioplasm appears to have collected in masses resembling conidia; and where fossilization has destroyed much of the continuity of a tube, a series of dark and more or less

spherical bodies may be seen. In some places, especially in the spaces between the minute curved dissepiments and tabulæ, hosts of globular spores, with or without tubes emanating from them, may be seen. In *Calceola sandalina* corresponding structures exist sometimes, and the method of entry of the parasite can be examined. The author gave two instances, one of which was seen in section. A decided flask-shaped cavity existed in the wall of the shell, opening outwards and rounded and closed inwards. It was crowded with globular spores (oospores), and these, where near the sides, had penetrated the hard shell, and thus gave a rugged and hairy appearance to the outline of the flask-shaped cavity. After noticing minute structures in a brachiopod included in a Silurian coral, and in a Lower Silurian foraminifer, the author asserted, from the results of his late researches upon the algæ parasitic in corals out of his own aquarium, that the fossil and recent forms are analogous in shape, size, and distribution. He considers that the old parasite resembles *Saprolegnia ferox* in its habit; and as he considers that *Empusina*, *Saprolegnia*, and *Achlya*—members of the Protista—are the same organisms, living under different physical conditions, he names the old form *Palæachlya penetrans*; and he believes that it entered the wall by the spores fixing on to the organic matter, and growing by its assimilation, and that carbonic anhydride was evolved. He considers that this acid, assisted by the force of growth and the movement of the cytioplasm, is sufficient to account for the presence of the tubes. Finally, the author draws attention to the probable similarity of external conditions in the Silurian and present times, and to the wonderful persistence of form of this low member of the Protista.

NOTES AND QUERIES.

Teeth of a Fly (?)—I shall be much obliged if some of the readers of Science-Gossip can give me a little information on the anatomy of a fly. I have always thought the ordinary house-fly was a suctorial; and, as such, had no need of teeth; but to my surprise I saw in the case of a F.R.M.S. a slide with the following printed label on it:—"Teeth of a fly—Smith, Beck, & Smith, Cornhill," &c. Of course such a highly respectable and well-known firm as that would not have made a mistake; and, wishing to correct my error in supposing flies did not have teeth, I popped the slide under a microscope and compared it with the tongue of a blow-fly. I observed a most striking resemblance between the "teeth" and the spiral tubes at the end of the tongue; indeed, it seemed as if a slice containing these tubes had been taken from a fly's tongue, mounted separately, and labelled "teeth"; and this opinion was shared by others who compared the two slides. Now as Smith & Beck have had labels printed for this slide, it is probable that they sell a good many of them; and, as they are so well known, they can hardly be guilty of defrauding their customers by palming off for 1s. 6d. a slice of a fly's tongue and calling it a fly's teeth. The conclusion I am obliged to come to therefore is, that flies have teeth: perhaps some one can inform me in what part they are to be found.—*T. J. B.*

Devil's Coach-horse.—It may interest some of your readers to hear of a curious old legend extant in Ireland regarding the "Devil's Coach-horse" (*Ocypus oleus*) in Irish "Dhaw-dheel." It is, to begin with, one of those things which, like "the weasel, the hare, and the red-headed girl," are considered extremely unlucky to encounter when setting out on a journey, and the reason is contained in the following legend. Whilst on earth our Lord was one day seeking to escape from the Jews, and passing by a field where some men were sowing corn He stopped to ask His way. The men gave him the directions He needed, and He then passed on. But no sooner had He done so than the corn they were sowing sprang up green and fresh, and ripened so quickly as to be fit for gathering the next day. While they were reaping it, a party of Jews came by, and asked if Jesus of Nazareth had passed that way. "He did," was the reply, "while we were sowing this crop." Thinking as a matter of course that this must have been months ago, the Jews were preparing to turn back, when the Dhaw-dheel, seated on the wall of the field, cocked up its tail, and said, "Ne-agh! Ne-agh!" ("Yesterday! Yesterday!" in Irish), so the Jews went on, and succeeded in taking our Lord prisoner. Since then the Dhaw-dheel has been regarded as accursed. A relation of mine recollects that when, as a child, he was walking through some pasture, accompanied by a peasant, he suddenly spied a strange caterpillar (which he afterwards recognized as the larva of *Dicranura vinula*, the Puss-moth), and, though he knew nothing of insects, wanted to carry it home, it looked so curious; but before he could pick it up, his companion sprang forward, and stamped on it, exclaiming as he did so, "That's the baste that gave the cattle the black-leg!"—*A. ff.*

Hawfinch.—Can any one inform me if it is not considered an unusual and rare occurrence to find the nest and eggs of the Hawfinch (*Coccothraustes vulgaris*) so far west as Somersetshire, having myself taken them in that county?—*Alfred Bindon.*

Wincopipe (S.-G., p. 15).—In some of the rural distircts about here it is not unusual to hear the country people use the word Wink-a-peeps (Eyes). A mother will say to her child, "Shut those wink-a-peeps and go to sleep," or when washing it, "Now close its wink-a-peeps to keep the soap out." When out on our Saturday afternoon Field Excursions I often hear such remarks as the following, relative to *Anagallis arvensis*:—"See, the dear little pimpernel is wide awake: we shall have a fine day"; "See the pimpernel is closing its eyes: we must push on"; "Oh! the pimpernel has gone to sleep: we must not venture far"; "The pimpernel is peeping out to see if it will be fine." I only remember having heard the pimpernel directly called Wink-a-peep once. We were out for a long ramble up the Bollin Valley: the day was so glorious that no one ever thought of consulting the "poor man's weather-glass." We had rambled a long way up the valley, when, passing through a field of oats, an elderly lady of the party rather startled me by stopping suddenly, and pointing into the standing oats, exclaiming, "Now, do you see that?" I looked, expecting to see a snake at least, but failing to discover anything to alarm her, I said, "Do I see what?" "See what, indeed! Do you not see those peevish little Wink-a-peeps have closed their petals,

and we so far from the station too!" May not this be the name Bacon mistook for "Wincopipe"? I think it is just the name children or country people would give the pimpernel, as it is always winking or peeping. The word is variously sounded in different districts about here: thus, Wink-a-peep, Wink-o-peep, Wink-un-peep, Wink-un-peeip, and in some parts of Cheshire they sound it something like Winco-poipe. The word or words are really Wink-and-peep.—*S. B. B., Manchester.*

Scarlet Pimpernel.—Lord Bacon calls this plant "Wincopipe," and noticed "if the flowers be close shut up, it betokeneth rain and foul weather; contrariwise, if they be opened abroad, fair weather." May not possibly the word *winco* be derived from the old Saxon word *winken*—which signifies to wink or close? And is not "pipe" or "pip" the same term as is now commonly applied by floriculturists to these wheel-shaped flowers, such as the primrose, cowslip, polyanthus, &c., which have very distinct centres, forming what by botanists is called an eye? Hence, we judge that "Wincopipe," which we presume means a winking or closing eye, was formerly given to this plant on account of its peculiarity in this respect. The Latin word *pipio*, to peep, may probably, we think, have some connection with the word "pipe." We are not aware that this local name is still applied to this interesting plant in any part of Great Britain at the present time, but it is still known by the names of "Shepherds' Barometer" and "Poor Man's Weather-glass," which names are very appropriate. The Pimpernel is also one of the best "floræ horologicæ," or clocks, opening its petals in our latitude about 7.10 a.m., and closing them between 2 and 3 o'clock p.m. The Pimpernel is bright scarlet, with generally a purple eye; and it is, with the exception of the poppy, our only scarlet wild flower. Of the genus *Anagallis* (Pimpernel), we have, according to Bentham two species only, *A. arvensis* and *A. tenella;* the former, however, contains two well-marked varieties, one blue and the other red, which are considered by some botanists as distinct species, under the names of *A. cærulea* and *A. arvensis*. Whether it may be more convenient to treat them as true species, or as mere varieties, it must at least be admitted that they differ considerably. Not only are they of different colours, the one blue, the other red, but *A. cærulea* is very decidedly smaller. The stamens and pistils ripen simultaneously, and therefore it would appear that they generally fertilize themselves, and the flowers contain no honey, and partially close (as before remarked) about 3 o'clock in the afternoon. Darwin "presumes from observation that the blue and red flowered forms of the Pimpernel, *A. arvensis*, which are sterile when crossed, are not merely fleeting varieties, but specifically distinct." Both the Blue and Scarlet Pimpernel were known to ancient writers, who were pleased to term the blue-flowering variety the "female," and the red the "male Imperial Pimpernel"; which idea Withering seems to have had when he published his early arrangement of "British Plants" in 1812, as he represents there, "Scarlet Pimpernel, male; Blue Pimpernel, female." Which notion the foregoing remarks will prove to be without foundation.—*E. Edwards.*

"Sylvan Sketches."—I should be obliged if any of your correspondents could tell me the name of the author and date of publication of this book. My copy, which was bought at a bookstall about twenty years since, has evidently been rebound, and the title-page is wanting. It contains a description of the trees and shrubs, native and introduced, which are to be found in Great Britain, each under its respective heading, with much pleasant and instructive matter, and many poetical references; and, from the style of type and quality of the paper, I should imagine it was published some time during the first forty years of the present century.—*Martin Gardner.*

The First Primrose.

Between two hedges void of bloom,
I wander'd on a sunny day;
So narrow was the winding way
That I had scarcely elbow-room!

I wonder'd where the laughing Spring
Had hidden all her treasures fair,
I long'd to breathe a softer air,
And hear the Summer's minstrels sing.

But Spring would shortly come, I knew,
Veil'd in a labyrinth of flowers,
And with the fragrant glowing hours
Would come divinest music too!

Whilst musing thus my glances fell
Upon a primrose, barely seen
Amid its mossy couch of green,
That did of coming glories tell!

When swiftly through my teeming brain
Flash'd visions of a brighter time—
A softer sky, a balmier clime—
When Spring should kiss my cheek again!

Yes, lovely herald! thou didst wake
To life within my yearning breast
Such holy thoughts of coming rest,
I love thee for thy mother's sake!

And for thine own! for thou wert brave
To tempt the nipping frosty wind;
And thus, the earnest of thy kind,
To point to winter's early grave!

F. B. Doveton, Exeter.

Anagallis arvensis is still known among country-people in Cheshire and Shropshire as "Wink-a'-peep." Doubtless Lord Bacon's "wincopipe," as quoted by "F. W." in last month's Science-Gossip, has the same derivation—namely, Wink and peep—from the habit the flower possesses of closing and winking in damp, and opening or peeping again in fine weather.—*E. H., Chester.*

Anagallis arvensis.—I have learnt from a kind friend that the *Anagallis arvensis* (scarlet pimpernel) is still known amongst the country people in Staffordshire by the name of "Wink-and-peep."—*E. Edwards.*

Encounter with a Polecat.—A fact came under my notice very lately of which I was unaware; viz., the extreme boldness of the Polecat. Walking on the summit of one of our South Coast downs, I came upon one of those animals, busily engaged in (I presume) rabbit-hunting, and about twenty yards from me. Turning round in the course of his investigations he caught sight of me, and surveyed me fixedly for a moment; but evidently concluding I was of no consequence, resumed them with the utmost indifference to my propinquity. Not having met with this animal before in a state of nature, I was anxious to obtain a nearer look at him, and with this view took advantage of the nature of the ground, and, descending a slope on my left, came up again at a point which brought me within six or eight yards of him. Care for my presence? Not a

bit of it! His indifference positively nettled me, aud, after watching him for a minute or two, I took aim with a thick walking-stick I was carrying, and hurled it at the brute, the stick fixing itself upright in the earth just behind him. This was too much for the gentlemau; turning angrily, up went his back just like a cat's, and such a loud spitting and swearing begau as I should not have thought the beast capable of producing. Nor was this all; for after examining the stick, and then giving me a look plainly expressing "You will, will you?" the beast came straight at me, revenge in his countenance. Now my stick was behind the advancing enemy, and, alas! not a stone was near. Would the beast attack my shins, or (unpleasant thought) climb up my clothes, and seize me by the throat or back of neck? All I knew about Polecats was that they bit horribly when they had the chance, and, not caring to verify this fact personally, I ——. Well! I rau down the slope and out of his way. Imagine my feelings when on looking back I saw my enemy surmounting the ridge, and following me, nose to ground! Some (alas! very small) stones provided me with ammunition, and I opened fire; so did the Polecat, spitting ferociously. At last one stone nearly took effect, and the enemy turned aside to investigate it angrily; then entered a thick furze-bush, and disappeared. Was he coming up under cover to the very furze-bush at my feet, thence to make a sally and attack my shins? I knew not, and retired. So apparently did the foe, for I saw no more of him, though, armed now with a goodly flint stone and my recovered stick, I sought him carefully. I confess I felt very small at my defeat, the more so when I considered that the slope down which I so ignominiously retreated was in reality part of a Roman vallum, upon which, no doubt, high deeds of valour had been performed in days of yore.—*W. Hambrough.*

Christmas-day, 1875.—I am sitting in a room without a fire; the sun's rays are too powerful to bear for long together; in the garden, strawberries, which bore fruit in October, are in flower for the third time in the year; and the lark and the thrush are singing.—*J. H., Watford.*

Enormous Puff-ball.—Frank J. Allen's large puff-ball described in your December number, is evidently *Lycoperdon bovista*, Badham (*Lycoperdon giganteum*, Cooke). This is entirely distinct from the common puff-ball, which never attains to so great a size. Badham says, "Its shape is different, being that of an inverted cone; never globular; the flesh also is more compact, while the membrane which holds what is first the pulp and afterwards the seed, is very thin and tender; the seed, moreover, has no caudal appendage; and, finally, a a considerable portion of the base is sterile, in all which particulars it is unlike *Lycoperdon plumbeum* (the common puff-ball). It is not of very unusual occurrence in the South of England, and I have met with it growing iu its conspicuous snowy beauty several times; more often, however, it is found barbarously scattered in a hundred fragments on the sward by some one ignorant of its culinary excellence. When young, *i.e.* before it begins to show the first signs of ripening, and when it can be cut without showing any yellow stains, it makes a delicious dish. Cut it in slices and fry in a little butter with egg and breadcrumbs, or sweet herbs, finely pounded or chopped, pepper and salt, and you will thauk me for the hint." I have tried it and can recommend Frank J. Allen to have the next specimen he finds cooked, if he likes a really toothsome dish. Only, remember, if it cannot be dressed very soou after gathering, it is of no use for the table, and may even do harm if eaten.—*Martin Gardner, Leyton.*

Hairworms from Beetle.—Some time back, when walking in the neighbourhood of Petersfield, seeing a beetle smartly running across the road, I quickly caught and conveyed it into a small bottle, in which were some bruised laurel-tops. On the following day, on taking it from the bottle, I observed protruding about an inch, from the posterior end of the body what appeared at first sight like pieces of wet hay. Taking my forceps, I carefully drew them from the body, and which I then found to be three hairworms, each about four and a half inches iu length. The worms I put into spirit, and now enclose one, together with the beetle from which they were taken. I believe there is nothing *new* in the fact I state, but thought, perhaps, it might interest some of your readers. The body of the beetle only measures about $\frac{3}{10}$ of an inch in length by $\frac{1}{8}$ in breadth.—*R. E., Southsea.*

"Microscopy" and "Microscopist."—I was much interested in the paper on "The Microscope, and Microscopic Work," in the January number, and I thank Mr. Kitton for the information it contains; but while agreeing with him in his strictures on the misapplied labour sometimes lavished on slides for the microscope—labour which must often entail a ruinous expenditure of eyesight—I demur to his denunciation of the terms "microscopy" and "microscopist." The former term, as I take it, comprehends the whole of microscopic work: the preparation and study of objects, the manipulation of the instrument and its accessories, and the interpretation of appearauces obtained through their aid. The latter term is a convenient expression for "microscopic worker" (using the words in their fullest sense)—a phrase Mr. Kitton employs farther on in the same paper to designate the student of the minute forms of life, though I do not think "telescopic worker," if applied to au astronomer, would seem less absurd than "telescopist." Is there not sufficient difference in the application of the two instruments, microscope and telescope, to justify the use of the words "microscopy" and "microscopist," and to account for the non-employment of the words "telescopy" and "telescopist"?—*W. R. H.*

Juniper Bushes.—On Southborough Common, midway between Tunbridge and Tuubridge Wells, there are many juniper bushes 12 feet high, and I have measured one over 16 feet. The part of the common where they flourish slopes considerably towards the west. As for the soil, the Tunbridge Wells sand (Hastings sand) stretches beyond Southborough.—*W. F.*

Communications Received up to 12th ult. from:—G. N. W.—Dr. T.—L. S.—T. J. B.—M. F.—E. T. N.—R. M.—H. E. W.—W. C. H.—S. L. M.—C. W. H.—E. E.—S. B. B.—W. F. F.—T. B. W.—A. F.—G. S.—T. W. D.—J. H. B.—C. P. H.—J. R. S. C.—F. H. B.—H. G. G.—M. G.—H. L.—E. L.—H. R.—W. L.—W. F.—G. S.—M. W.—J. W. B.—C. F. W.—R. L. G.—H. J. W.—J. W. M.—C. W. W.—S. L. B.—S. S.—C. D.—W. R. B.—W. H.—J. P.—E. T. S.—H. F., jun.—J. C.—W. F. W.—E. E.—T. W.—B. A. R. B.—J. H. B. B.—W. J. D.—J. R.—J. G.—D. R.—W. H. G.—M. S.—J. R. J.—R. P.—F. L.—F. H. A.—H. E. W.—G. R. V.—H. E. F.—S. M. P.—W. L. S.—C. S.—W. H. P.—W. F.—R. W.—S. A. S.—W. B. H.—L. R. V.—R. S. T.—W. S.—W. K. M.—A. L. P. H.—T. B. W.—H. P.—G. O. H.—F. A. A.—N. B. F.—G. C. D.—F. J. A.—H. M. J. U.—B. W. P.—Dr. C. C. A.—W. W. R.—J. W. M.—R. M. L.—M. G.—J. F. J., &c., &c.

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

G. N. W.—The grubs are the larvæ of a species of *Otiorynchus*. The best plan of getting rid of them from roots is by disturbing the soil. Try a little soot, both for top-dressing and mixing with the soil. It is difficult to get rid of these pests when once they have taken possession.

Dr. T.—Whitaker's "Guide to the Geology of London" (price 1s.) may be had of E. Stanford & Co., Charing-cross, or at the door of the School for Mines, Jermyn-street.

L. S.—The quotation is a good illustration of how a great error is always mixed up with a *little* truth. The fact is that the caterpillar of the *Hepialus virescens* (a well-known New Zealand moth) is affected by a peculiar parasitic fungus, called *Sphæria Robertsii*, which lives at its expense, and eventually kills it. The idea of a plant growing out of it, bearing flowers and seeds, is additional nonsense.

H. E. Watney.—You will find a notice of the Leek in the article on "Cultivated Vegetables," on p. 145 of the volume of Science-Gossip for 1874.

W. C. H.—Your question is rather difficult to answer, as the objects you name belong to the animal as well as the vegetable kingdom. Dr. Bree's "Lower Forms of Life," published at the *Field* office, will give you a good account of the animals you name. Cooke's "Fungi," published by H. S. King & Co., will be the best to consult as to the rest. Dr. Bastian reviews Pasteur's researches in his "Beginnings of Life."

J. W. Mee.—Your sea-weed is *Plocamium coccineum*, a species which has a very extensive geographical distribution.

J. E. Jellico.—The Tortoise-shell Butterflies hybernate during the winter, and it is no uncommon occurrence to see them roused into activity during a warmer day than usual. They may then be seen indulging in a weakly flight.

M. G.—Get Yarrell's "British Birds"; the edition edited by Prof. Newton is the best and most trustworthy. You may get a tabulated list of birds, we should think, from E. Newman, Bishopsgate-street, the editor of the *Zoologist*.

C. Swatman.—You will get all the microscopical materials and objects you require at E. Wheeler's, 48, Tollington-road, Holloway, London.

G. R. Vine.—The specimens from river deposit at Cleethorpe were badly packed, and came so smashed together that it was impossible to make them out.

H. E. Forrest.—No translation of the book you mention has appeared. You had better get Dr. Pritchard's "Infusoria." Although an old work, it has not been superseded.

M. S.—Your shells are:—1. *Succinea putris*; 2. *Lymnea auricularia*. Mosses will be named next month.

N. B. French.—We do not think the Turntable mentioned on p. 15 of Science-Gossip is to be purchased. You had better apply to the inventor, whose name is there given, and who may be found by addressing a letter to him, in charge of the Secretary of the Society.

Erratum.—P. 46, col. 1, lines 9 and 10. "*Un*conscious," should be "conscious."

J. H. B. Brooke.—If you will rub common tobacco snuff into the fur of your dormouse, the ticks will soon be got rid of. We have tried it with ferrets, and it answered very well. —*B. A. R. B.*

W. F. Wakefield.—You will see your question, relating to the "Vegetable Caterpillar," answered in another part of this column to *L. S.*

H.—Inquire at 192, Piccadilly about the parts of Schmidt's "Diatomacea." Dr. Donkin, of Newcastle, has published a work, in parts, on "British Diatoms."

EXCHANGES.

Beautiful Sand from Loango replete in interesting objects for mounting. Send a well-mounted object of interest, or unmounted Diatoms, or Spicula from Sponge, if not broken.—E. Eaton, 48, Currier's-lane, Ipswich.

For half-section of a Cocoon of the *Bombyx Yama-mai*, with all the silk on, send stamp and address to W. H. Gomm, Somerton, Somerset.

For Hair of *Halithea aculeata* (Sea-mouse) unmounted, send other object of microscopic interest to Mrs. S., Brentford End, Middlesex, W.

Well set, correctly named British Beetles, for British Plants, not necessarily uncommon, but must be well dried, and mounted, and correctly named.—W. R. B., care of Mr. Edwards, Lane's Buildings, St. Faith's-lane, Norwich.

Could any of your American readers furnish me with some live specimens of *Rana pipiens* (the great Bull-frog of the United States)? If any would be willing to exchange the above species for anything I could offer, I should be glad.—Frank Latchmone, Hitchin, Herts, England.

Fossil Wood, from Clay Ironstone, 300 yards deep, showing fibre well and easily separated minutely; for any good Slides.—Horace Pearce, the Limes, Stourbridge.

A fine living plant of the New Zealand Fern, *Todea superba*, for Foreign Shells.—T. R., 27, Oldham-road, Manchester.

Eggs of Squacco Heron, Little R. Plover, Hooded Crow, Black Redstart, and others; for other good Eggs (American eggs preferred).—C. Dixon, 60, Albert-road, Heeley, near Sheffield.

Crystals of *Echinocactus vionaga*, floret of *Trichinium*, and other first-class botanical Slides, offered in exchange for entomological or geological subjects. Lists exchanged.—Address, the "Gardener," Rawden House, Hoddesdon, Herts.

A Student's Microscope, by Beck; Eye-pieces C, D, E, F, by Ross, Kellner C to D, 1-10th inch Object-glass, by Ross; and an Immersion Parabola, for exchange or otherwise.—W. J. Dickson, M.D., Falkland, Fifeshire, N.B.

Cuticle of Ivy, and Pollen of *Lilium auratum*, well mounted, for good Slides.—T. H. Buffham, Clarendon-road, Walthamstow.

Carboniferous Limestone Foraminifera, *mounted*, for Lias, Oolite, Chalk Marl, or Eocene Foraminifera, mounted or unmounted.—G. R. Vine, Hill Top, Attercliffe, near Sheffield.

Yorkshire *Unios*, or *Anodontas*, or *Limnæa stagnalis*, for the same species from any other county.—J. Whitwham, Cross-lane Marsh, Huddersfield.

Offered:—857, 1,036, 1,084, 1,109, 1,142, 1,215, 1,216, 1,241, 1,242, 1,339, 1,387, 1,465, 1,470, 1,580, 1,565, 1,570*b*, 1,607, 1,653, 1654, 1,665*b*, &c., "Lon. Cat.," 7th edition, for other Plants, —John Wm. Burton, 35, Hemans-street, Liverpool.

Good Specimen of Tengmalm's Owl (*Nyctale funerea*), shot near Whitby, in exchange for a good History of British Birds. —Wm. Lister, Glaisdale, Yarm, Yorkshire.

English Mechanic, vols. xix. and xx., and 21 numbers of vol. xxi., unbound, for B Eye-piece or 2 in. Acro. Objective for Micro.—H. Ricket.

I will give three Slides for a good Geological or Fossil Section, mounted. List sent for selection.—E. Lovett, Holly Mount, Croydon.

Marine Dredgings from coast of Tangiers, on receipt of stamped envelope.—E. Lovett, Holly Mount, Croydon.

Six species of American *Echinodermata*, including the very rare *Ctenodiscus crispatus* and *Astrophyton Agassizii*, given for any volume of Science-Gossip except the 11th (unbound). Would be glad to exchange Mollusca and Crustacea for same, or for any of the first seven volumes of *Nature*.—E. T. Nelson, Delaware, Ohio, U.S.A.

Wanted, a quantity of Bermuda Fossil Earth, for Beetles or Parasites, mounted.—M. Fowler, 20, Burn-row, Slamannan, near Falkirk, N.B.

Wanted, five good Injections for a Section-cutting Machine, mahogany, brass mountings.—M. Fowler, 20, Burn-row, Slamannan, near Falkirk, N.B.

Wanted, series of *G. C. album*, *P. cardui*, *L. sibylla*, *A. iris*, *E. epiphron*, *E. medea*, *C. davus*, *N. lucina*, *T. betulæ*, *C. hyale*, *C. edusa*, *L. sinapis*, &c. *Lepidoptera* and *Mollusca* offered.—W. K. Mann.

BOOKS, &c., RECEIVED.

"The Compleat Angler." By Izaak Walton. A fac-simile reprint. London: Elliot Hock.

"Scientific Culture." By Prof. J. B. Cooke. London: H. S. King & Co.

"Domestic Floriculture." By F. W. Burbidge. Edinburgh: W. Blackwood.

"Out and About." By Hain Friswell. London: Groombridge.

"The Dwellers in our Gardens." By Sara Wood. London: Groombridge.

"Health in India." By Dr. Tilt. 4th edition. London: J. & A. Churchill.

"Memoirs of Caroline Herschel." By Mrs. John Herschel. London: J. Murray.

"Reflections and Maxims." By W. Penn. London: Groombridge.

"Sketches of British Insects." By Rev. W. B. Houghton. London: Groombridge.

"Smithsonian Report for 1874." Washington: Government Printing Office.

"Potter's American Monthly."

"American Naturalist."

"Monthly Microscopical Journal." February.

"Land and Water." February.

"Journal of Applied Science."

"Les Mondes."

"The American Journal of Microscopy."

"The Western."

"The Educational Reporter."

"The House."

"The Colonies."

"Fancier's Journal."

"Ben Brierley's Journal."

&c. &c. &c.

HISTORY OF OUR CULTIVATED VEGETABLES.

No. XVII.—SEA-KALE (*Crambe maritima*).

THIS excellent and most valuable vegetable in its wild state is found on many parts of sea-coasts, but which the march of modern horticulture has brought into very general cultivation, belongs to the same natural order as the Cabbage and Turnip tribe, but differs from them by having a globose seed-vessel, containing one seed only. Some authors think that *Halmyridia*, mentioned by Pliny, is the same as this vegetable; but the Romans did not cultivate it in their gardens in his time, they used it as a sea provision during long voyages; gathering it where it grew wild, and cutting it up, they preserved it in barrels, where oil had recently been kept, and then closed them up to prevent the action of the atmosphere. It would be very difficult to ascertain the precise period when this esculent was first used in England as a culinary plant, for on many parts of the seacoast, especially of Devon, Dorset, and Sussex, the inhabitants from time immemorial have been in the practice of procuring it for their tables, preferring it to all other greens; they seek for the plant in the spring where it grows spontaneously, and as soon as it appears above the ground, they remove the pebbles or sand with which it is covered to the depth of several inches, and cut off the young and tender leaves and stalks, as yet unexpanded, and in a blanched state, close to the crown of the root; it is then in its greatest perfection: when the leaves are fully grown they become hard and bitter, and the plant is not eatable. Our oldest English authorities who give any account of this plant and its habitats are Turner and Gerard. The former, who lived in the sixteenth century, says, in his Herbal, "this herb groweth at Dover hard by the sea-side, and in many other places. I named it Brassica Dobrica, in English Dover-cole, because I found it first beside Dover." We also read in the first volume of "Transactions of the Horticultural Society," that plants of Sea-kale were sent from this country to the continent by L'Obel and Turner at that early period. Gerard, who observes in his Herbal that the sea colewort groweth naturally upon the beach and brim of the sea where there is no earth to be seen, but sand and rolling pebbles. He found it growing between Whitstable and the Isle of Thanet, and in many places near Colchester and elsewhere by the seaside.

Parkinson notices it in his "Paradisus," which was published in 1629, and Bryant also in his "Flora Diætetica," about 1783. Philip Miller has the honour of being the first who wrote upon it professionally as an esculent, telling us, in the first edition of his "Gardener's Dictionary," published 1731, that the inhabitants of Sussex gather the wild plant to eat in the spring, soon after the heads are thrust out of the ground, otherwise it will be tough and rank. Professor Martyn next, in the last edition of the same work, has printed some valuable instructions how to cultivate this plant from the MS. of the Rev.—Laurent.

It is stated by a writer in the first volume of "Notes and Queries," fourth series, that a person of the name of Morgan, a native of Devon, and gardener in the employ of J. H. Southcote, of Stoke Fleming, cultivated some plants he found growing wild on the beach at Slapton; they were so appreciated by his master, that several roots were sent as presents to Mr. Southcote's friends at Bath: this was about 1775. When once known and talked of in Bath, it soon became found through that part of

England. This writer states that Sea-kale was first sold to the public at Exeter market at the price of two shillings and sixpence per root. In the same volume, page 255, it is stated that the Rev. John Fremen, who was vicar of Sidbury, near Sidmouth, between 1707-13, was the first person that sent Sea-kale to the London market; but it appears to have been little appreciated. About the middle of the last century, Mr. Giles Templeman, of Dorchester, sent some roots to Covent Garden market; but the plant was then so little known, that the labels having been defaced in the carriage to London, the contents of the parcel were put aside as being some sort of "poisonous root, or other."

Dr. Lettsom, in his horticultural sketch of his residence at Grove Hill, Camberwell, 1794, mentions this esculent amongst others grown by him, and expresses as a matter of surprise that a vegetable so useful and productive, and easy of cultivation, should be so rarely met with in the gardens about London.

Curtis, in his pamphlet on the culture of Sea-kale, published 1822, states that Sir William Jones, of Chelsea, says he saw bundles of this vegetable exposed for sale in the market at Chichester in 1753. "I have learned from different persons," says Curtis, "that attempts had been made at various times to introduce Sea-kale into the London markets, but ineffectually; a few years since I renewed the attempt myself, and though it was not attended with all the success I would wish, I flatter myself it has been the means of making the plant so generally known, that in future the markets of the first city of the world will be duly supplied with this most desirable article."

The Sea-kale is not much cultivated on the Continent. Valmount de Bomare calls it Chou marin sauvage d'Angleterre, and so condemned the plant as only fit for the coarser tastes of the inhabitants of colder climates; but in the present day it is seen in the markets of Paris and other French towns.

As to its excellence as a food, persons differ, as they do in all matters of taste; some preferring it even to asparagus, to which it is related in point of flavour; others regarding it as little superior to cabbage. In its sensible effects on the human body it comes nearer to the Cabbage tribe than asparagus. It is stated as a most desirable vegetable for sedentary persons, or such as have weak stomachs, being remarkably light and easy of digestion, and abounding in alkali rather than acids.

No. XVIII.—VIPER'S-GRASS (*Scorzonera hispanica*).

This vegetable is indigenous to Spain; it was introduced into this country about 1576, some years after the Skirret, and, like it, was formerly more cultivated than it is at present. Its root has not, however, the peculiar sweetness of the latter, but it is extremely delicate, and when properly prepared makes so pleasant an addition to the list of culinary vegetables, that it appears to be unjustly excluded from our gardens; and, according to Beckmann, like several other vegetables, has been banished by fashion; "for this tyrant, which rules with universal sway, commands the taste, as well as the smell, to consider as intolerable articles to which our ancestors had peculiar attachment." Scorzonera was first known on account of its supposed medicinal properties, about the middle of the sixteenth century, in Spain, where it was esteemed as an antidote to the poison of a snake, called there *scurzo*. A Moor, it is said, who had learnt in Africa that this plant possessed so valuable a property, availed himself of the knowledge in effecting many cures with the juices of the leaves and roots upon peasants who had been bitten by these venomous reptiles while mowing; but he carefully concealed the plant, that he might retain to himself all the honour and the profit attendant on the discovery. He was at last observed to gather it among the mountains, to which the name of Scorzonera was then given from the name of the snake, the venom of which it was believed to render innocuous. The knowledge was quickly disseminated. Peter Cannizer transmitted the plant, together with a drawing of it, to John Oderich Melchior, physician to the Queen of Bohemia, and he, in his turn, lost no time in sending it to Matthioli, who had not any previous knowledge of the plant (see "Matthioli Epist. Medic.," p. 210). Soon after this Nicholas Monardes published a tract in which the particular virtue of these roots was panegyrized. It is probable that in Spain their adaptation as an edible substance was likewise first discovered; and thence, about the beginning of the 17th century, it was introduced into France. The author of "Le Jardinier François," published 1616, who was a practical as well as theoretical gardener, assigns to his own exertions its first cultivation in the French gardens. (Beckmann.)

Another plant belonging to the same natural order (Compositæ), and is now rarely seen in our gardens, is the Salsify (*Tragopogon porrifolius*). Dioscorides describes this plant, and his description answers in every respect except in the shortness of the stem. He says it is an edible herb, with leaves like garlic, a short stem, a long sweet root, with a large flower-cup on the top of the stalk. It is stated that Dr. Sibthorp did not meet with this plant in Greece, and it finds a place in his "Prod. Fl. Græca," merely as having been discovered by Abbate Sestini near Constantinople; but it might have been cultivated in Greece as elsewhere.

Evelyn, in his "Acetaria," tells us that the common Goat's-beard (*Tragopogon pratensis*) was grown as a vegetable in his day, "but that the name had been lately Italianized, and called Salsifix; and the seed.

sellers to disguise it being a very common field herb growing in most parts of England, would have it thought, with many other plants, to be an exotic, and call it Salsify, whilst by whatever name dignified or distinguished, it must be owned," says this author, "to be an excellent salet root."

Parkinson also mentions the common Goat's-beard as being cultivated in his day.

The flowers of the Salsify are purple, while those of the Goat's-beard are yellow. Linnæus, in his dissertation on the "Sexes of Plants," relates that he obtained a mule plant by sprinkling the stigmas of *T. pratensis* with the pollen of *T. porrifolius*, and the progeny of the seed had purple flowers, yellow at the base, evidently of an intermediate nature between the two parents; nor can anything, as Linnæus observes, more decidedly evince the generation of plants. The Salsify is found apparently growing wild in the southern parts of England, but there is no doubt that it is an escape from cultivation. The root, when boiled, mashed, and fried in butter, has the flavour of oyster patties; indeed, I have heard the plant called the "Vegetable Oyster."

Dr. Lettsom says that the roots of this plant and that of the Scorzonera, when roasted, eat with a pleasant flavour equal to that of chestnuts.

Charles Bryant, of Norwich, in his "Flora Dietetica," published in 1783, says that the roots of the Scorzonera used to be preserved with sugar in the same manner as the Eryngo, Sea Holly.

Both the Scorzonera and the Salsify are almost invariably attacked by *Erysiphe cichoracearum*, a small parasitic fungus, one of the mildews, but it has not the effect of injuring the growth of plants much, as it is late in the summer when it makes its appearance, in the form of numerous white blotches on the leaves.

The Salsify is abundantly cultivated on the Continent. The flowers of this and the Goat's-beard close at mid-day, and therefore are known by the name in many parts of the country as Go-to-bed-at-noon. It is stated by Villars that the children in Dauphiné eat the stem and leaves of the young plant, before the flowers appear, with great avidity, and that the fresh juice of these tender herbs is a good remedy for bile.

The generic name of this plant is derived from *tragos*, goat, and *pogon*, beard, from the bearded appearance of the seed; the specific name from *porrum*, the leek, on account of the resemblance of the leaves to that vegetable.

HAMPDEN G. GLASSPOOLE.

BUFFONIA TENUIFOLIA.—"It is pretty well established that Smith was wrong as to the intention of Linnæus in the application of this name."—*Alcock's Botanical Names for English Readers.*

ON THE SIRENIA.

BY THOMAS SOUTHWELL, F.Z.S.,
Honorary Secretary to the Norfolk and Norwich Neturalists' Society.

(*Continued from p.* 59.)

THE DUGONG.

THE Dugong (*Halicore dugong*, Illiger) is closely allied to the Manatee both in habits and appearance. Although confined to the tropics, this species has a wide geographical range; it is found, according to Murray (Geo. Dist. of Mam.), on the eastern coast of Africa, from 20° S. latitude, northward to the Red Sea; on the coast of the Arabian Sea, Ceolon, Bay of Bengal, and Cochin China, as far as 20° N. latitude; also in the Indian Archipelago, and the northern part of Australia. In general appearance it much resembles the Manatee, but may at once be distinguished by its forked tail, which organ in the Manatee is rounded; in the male, the tusk-like incisors are permanent, but in the female these do not penetrate the gum; the canines are absent, and the grinders, three in number, on each side either jaw. The flippers are devoid of any nail-like appendages. In length it exceeds the Manatee, and is said sometimes to reach 20 feet, but about 10 feet appears to be the usual size. The skin is smooth and thick, with a few scattered hairs, brownish-black or slate-coloured, lighter on the under parts, and occasionally white on the breast and belly. The flesh is said by some to be excellent as an article of food, by others it is esteemed quite the reverse.

The habits and food of the Dugong are very similar to those of the Manatee: like it, this species frequents the still, shallow waters of bays and creeks, where it feeds on the submarine vegetation, which abounds in the warm waters of the tropics. In such situations it was formerly very abundant, and fed below the surface in large flocks. When rising to breathe, it is said to have been so fearless as to permit itself to be handled, and that the fattest and youngest were thus selected and shot, or forced on shore. (Leguat.) Sir Emerson Tennent thus speaks of the Dugong in Ceylon: "One of the most remarkable animals on the coast is the Dugong, a phytophagous cetacean, numbers of which are attracted to the inlets, from the Bay of Calpentyn to Adam's Bridge, by the still water, and the abundance of marine algæ in these parts of the gulf. The rude approach to the human outline, observed in the shape of the head of this creature, and the attitude of the mother while suckling her young, clasping it to her breast with one flipper, while swimming with the other, holding the heads of both above water, and when disturbed, suddenly diving and displaying her fish-like tail,—these, together with her habitual de-

monstration of strong maternal affection, probably gave rise to the fable of the mermaid; and thus that earliest invention of mythical physiology may be traced to the Arab seamen and the Greeks, who had watched the movements of the Dugong in the waters of Manaar" (vol. ii. pp. 557-8). The only figure of the Dugong, not altogether a fancy sketch, with which I am acquainted, is to be found in the "Philosophical Trausactions" for 1820, and is taken from a specimen sent from Sumatra to Sir Everard Home, by Sir T. S. Raffles: this has been frequently reproduced (see fig. 32), but a good portrait of the animal is still a desideratum. The Australian Dugong has been described as a distinct species, under the name of *Halicore australis*, but Dr. Gray, "after a careful study and comparison," was "unable to discover any external difference or character in the skull or skeleton," by which to separate the Indian from the Australian Dugong." (Cat. Seals and Whales, p. 363.)

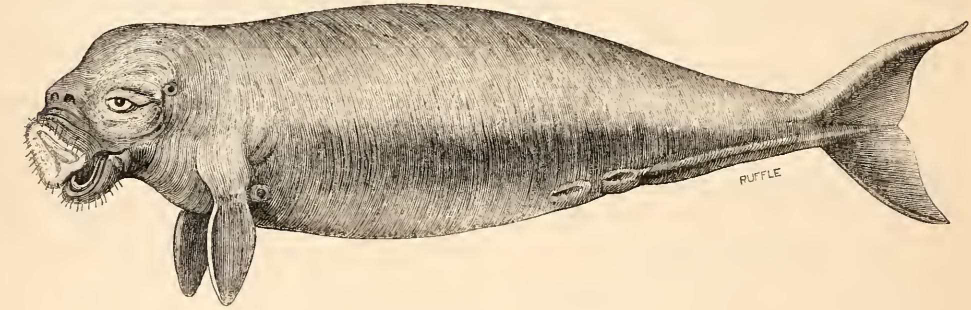

Fig. 33. The Dugong (*Halicore Dugong*).

Rüppell, under the name of *Halicore tabernaculi*, describes a dugong found by him inhabiting the coral banks on the Abyssinian coast of the Red Sea, near the Dhalac Islands, which he considered different from the species inhabiting the Indian Ocean; he gave it its specific name, under the belief that the Jews used the skin of this animal to form the veil of the tabernacle. Dr. Gray had not had the opportunity of comparing skulls and skins of animals from that locality, but he thought it probable that it would prove to be the same as the Dugong from India aud Australia.

The only other recent representative of this remarkable order, *Rhytina Stelleri*, Illiger (*Rhytina gigas*, Gray), although in all probability now extinct, has so recently passed out of existence, and is so interesting a species, that I cannot omit to notice it. The Rhytina, unlike the Manatee and Dugong, its near allies, inhabited the Arctic Circle, and was very restricted in its range; it was discovered by Steller, the naturalist to Bhering's second expedition, in the year 1741, on an island lying to the S.W. of Bhering's Straits, and now known as Bhering's Island. During an enforced residence of ten months on this island, arising from the loss of their ship, Steller studied this remarkable animal, of which his memoir, published in 1751, after the death of the author, is the only record.*

The Rhytina was distinguished by the total absence of teeth, mastication being performed by a pair of curious horny plates, one attached to the palate, the other to the lower jaw; the lips were double, the outer upper one thickly set with bristles, "like a broom." Its skin was covered by a thick fibrous epidermis, "like the bark of an old oak, rather than the skin of an animal, black, scabby, wrinkled, rugged, hard, and tough; destitute of hair, scarcely affected by axes, or the point of a hook—an inch thick." (Steller.) This epidermis was composed of horny tubes, arranged perpendicularly side by side, like closely-packed fibre, and is said to have presented a section like ebony; the fibres were rooted in the true skin, but easily detached, aud through them a moisture plentifully exuded, which, when the auimal was exposed to the air, kept it constantly moist. When wet, its colour was black-brown, but when dry wholly black, sometimes variegated with white. The true skin was thick, soft, white, and very firm. The head was small and oblong, the paws ending in claw-like callosities, the body gradually growing more slender towards the tail, which was bifid, horizontal, and fringed with long fibres like whalebone; mammæ two and pectoral. Steller gives the length of one measured by himself as 24 ft. 8 in., aud its greatest circumference 20 ft. 4 in., and estimates its weight at 8,000 lb.

Of the habits of this curious animal, which it will be seen greatly resembled those of the Manatee and Dugong, Steller gives an interestiug account. He says, "It happeued to me on an unfortunate occasion that for ten months I observed the manners and customs of these auimals daily before my cottage door; hence those things which were observed

* "De Bestiis Marinis." By G. W. Steller, Comm. Nov. Ac. Sc. Petrop., tom. ii. p. 294, *et seq.* 1749-51.

by me I will subjoin briefly." They frequented the shallow and sandy places about the sea-shore and the mouths of rivers, attracted by the freshness of the waters; when feeding, the young ones were kept in the centre of the flock, and they approached so close to the shore, that their backs would be above water as they fed, the gulls often alighting on them to feed on the parasites with which their skin was infested. They were so fearless that he often stroked their backs with his hand, and when injured they merely retired to deeper water, soon returning, as though the injury were forgotten. They appeared to be monogamous, and to bring forth their single young one in the autumn. When feeding, which they did most voraciously, about every five minutes they thrust their nostrils out of the water to breathe. Although such voracious animals, they appear to have selected certain sorts of seaweed on which to feed, in preference to others. In winter they seem to have fared very badly, many being killed by being dashed against the rocks by the waves, or suffocated in the ice: all at this season were miserably thin. The old ones evinced the most touching affection for each other and their young, and an old male, whose mate had been killed, could not be driven from the spot so long as her body remained in the water, and continued to haunt the spot for three days, anxiously awaiting her return.

They were captured by a large hook, like the blade of an anchor, with a line attached, which was taken out in a boat, the other end of the line being on the shore. When the animal was struck, the men on the shore drew "the resisting one" to land, and when it was wearied, and perfectly quiet, despatched it with daggers and knives, "some cutting off immense pieces from the live animal." The only resistance it offered was expressed by a vehement vibration of the tail and fore-arms, accompanied by loud breathing. Large pieces of the rough outer skin frequently became detached during its struggles.

When Steller first discovered this animal in 1741, it existed in such immense numbers that he observes there were sufficient to feed the whole of Kamschatka; twenty-seven years after, in the year 1768, the last of its kind is believed to have been killed. The existence of such a valuable supply of excellent food, so easily obtainable, soon became known, and the whalers at once made Bhering's Island their winter quarters, and resorted thither to provision their ships; the result was the speedy destruction of this harmless and interesting animal. The only remains of the Rhytina known to exist are, according to Dr. Gray, two ribs in the British Museum, received from the St. Petersburg Museum, and three skeletons in Russia,—one at St. Petersburg, the second at Helsingfors, and the third at Moscow.

That the other members of this remarkable family will soon share the fate of the Rhytina there can be very little doubt, for already it has been discovered that, in addition to the value of its flesh as an article of food, the oil obtained from the fat of the Dugong possesses all the remedial properties for which cod-liver oil has become so noted; for this purpose Mr. Scott* says, that of late years, in New South Wales, "harpoons, nets, and boats with organized crews, have been employed" in its capture. I cannot share in his regret that "now that it has the experience of the ways of man" the difficulty of obtaining the Dugong has cramped the enterprise; were it otherwise, its days would be short indeed—in fact, limited to the exact period required to kill and boil down every dugong in New South Wales.

How constantly we have to regret that by thoughtless and greedy slaughter, animals, which properly protected and used with moderation, might long have been preserved for our benefit, have been utterly exterminated; and yet the present state of the Northern seal-fishery shows how slow we are at learning the lesson! When will man learn that it is not by *killing* the goose that the golden eggs are to be obtained?

WHITE AND COLOURED VARNISH FOR "RINGING" SLIDES.

UNTIL within a comparatively recent period the majority of microscope slides were covered with elaborately gold-ornamented coloured papers; but as this covering prevented the use of the Lieberkuhn, which, with the binocular, has now become an almost indispensable part of the instrument, as well as the plan being inapplicable where large and deep cells are required, it has very justly come to be discontinued. On the other hand, many slides were finished off by being placed upon the turntable and neatly encircled with a well-formed ring of asphalt, or of coachmaker's black varnish, giving them an exceedingly stylish appearance, better appreciable, however, in the daytime and in the cabinet, than suited to the gloomy shade of the microscope lamp of an evening; hence it is not surprising that light and bright colours should be thought to be an advantageous substitute, and to have become very generally adopted.

A few years ago some slides came under my notice in which this black ring had been superseded by a foundation of some light-coloured material, which, from its dingy and discoloured surface, appeared to be composed of ordinary white paint, or white lead, and the reflection made at the moment was, that had the "permanent white" or oxide of zinc been used, and a smooth or varnish surface been obtained, it would neither have become discoloured

* "Mammalia, Recent and Extinct." By A. W. Scott, M.A. Sydney, New South Wales. 1873.

r soiled by any amount of handling or exclusion from the light; and this idea was no sooner started than the necessary steps for putting it into practice were immediately taken, and which were attended by complete success; for the slides done at that time are still as fresh and as perfect as at first.

About that period, it having been found that gum-dammar dissolved in pure benzole formed an excellent varnish, this solution, coloured with vermilion, was coming into use, which, relieved with an inner circle of pure white, produced a neat and pleasing appearance; but now a "happy thought" occurred, which has resulted in making the application of these coloured varnishes both useful and ornamental.

Introducing a variety of coloured rings upon the white ground, the thought suggested itself that these colours, with differently arranged combinations, might be made to serve as distinguishing characters for different classes of objects; thus, for instance, all vegetable substances might be noted by a circle of green, while blue would serve to

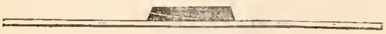

Fig. 34. Section of cell completed.

A

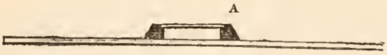

Fig. 35. Section of cell with too large a cover, showing the weakness of its attachment.

denote such as were of animal origin, and red or yellow those of the mineral kingdom. Then, by broad and narrow lines, and the order in which they were placed, almost any amount of subdivision of classification might be attained, and these would be sufficiently conspicuous by artificial light to help very materially in finding any particular slide that might be required, and thus be the means of saving both time and trouble at a critical moment.

Where *strength* is required, as in fixing down cells and putting on the covers, gum-dammar, however, must not be trusted to, as it is too brittle to answer these purposes, and which brittleness is not lessened by its solution in benzole; yet, for other purposes, it is invaluable, and being soluble without heat and in any proportions, a solution may be made of any consistence; although about the thickness of rich cream, to be diluted when being used, if necessary, will be found the most convenient. Now, as *security* is one of the first objects to be considered both in fastening down the cell and in putting on the cover, any means which can aid in attaining this object should not be neglected; and as immediately following the fixing of the covers comes the most critical part of the whole proceeding (for should any imperfection exist at this stage, failure, in all probability, will be the result), it is most important that this should be seen to before going any further; and whereas the slightest crevice or fissure will be sufficient to allow of "running in," or admitting air, the chance of such existing should be avoided by giving one coat of *thin* asphalt over the whole, extending from the glass slip on to the upper surface of the cover; the latter, however, should, when dry, be scraped off clean, so that it shall not project above but be on a level with the glass disc.

That there may be no risk of any subsequent application of varnish softening or injuring the asphalt, it is a commendable plan to apply a layer of some kind of size or varnish *not soluble in benzole*, as, for instance, either gum or shellac dissolved in spirit of wine, &c.

For dry mountings, a solution of gum-arabic answers perfectly; but this should have a small proportion of sugar added to it to make it less brittle when dry and not liable to crack, which also increases its adhesiveness. It is also advisable to add a small quantity of zinc-white in powder, as this both adds to its body and renders it more conspicuous in application; thus obviating the liability

Fig. 36. Cell and slide seen edgeways, showing the shape of the foundation.

A

Fig. 37. Fig. 34 in section.

of any part being missed. Zinc-white, or *oxide of zinc*, may be purchased at almost any chemist's for a few pence per ounce, and is far preferable to either white lead, flake-white, or whiting; and as the dammar varnish is equally inexpensive, it is much better for several reasons to use only a moderately thin coating of gum, and to fill up the foundation with dammar instead of any other gum compound. To make the white dammar varnish, put a small quantity of the zinc-white into a small wide-mouthed phial, and pour over it three or four times its bulk of benzole, when it will immediately form a smooth fluid without any appearance of "lumpiness"; after which add a few pieces of dammar, and cork up till dissolved. This solution, when well stirred up, and a drop put upon a piece of glass, ought to dry with a bright surface; should it not do so, more dammar must be added until it does, when it will be ready for use. It may be observed, that in mixing any kind of powder with a viscid solution, such as gum or varnish, it is imperative that it be first moistened with a thinner solvent, as with water for the gum, or benzole for the others; otherwise, if it be added dry, it will inevitably become "lumpy," and scarcely be able to be made smooth by any amount of stirring afterwards.

Having securely protected the cell from the action of any solvent, we may now proceed to fill up the angles, so as to get the most suitable shape

and form of the "foundation" for the subsequent treatment. In putting on a sufficient quantity of the foundation varnish to fill up the angle of the cell, it will generally spread irregularly and farther over the slide than is required; but this can be wiped or driven up to its place by means of the brush handle, which has been cut obliquely to a flattened point, and should be pressed against it whilst the slide is being gently rotated. After this, and while the varnish is quite fresh, the table should be rapidly revolved for a few seconds, to cause it to be evenly distributed around the cell, at the same time that it gives to the surface a high glaze, which imparts to it quite an enamelled appearance. It should now present the outline given in the accompanying diagram, fig. 34.

To obtain a secure attachment of the thin glass cover, it is important that its size should not exceed the diameter of the cell itself; but, in fact, it should be a trifle less than the outer edge of the cell wall, leaving a small margin upon the latter to be filled up with the cement, as indicated at A in fig. 35; and at this stage no *cement*, but only the faint edge of the sizing of gum, should project *above* the glass, as this constitutes a part of the remaining process. It cannot be too strongly impressed upon the reader's attention that it is not the amount of cement *spread over the surface of the cover* that adds anything to its strength; but that this latter result is only to be obtained by a thorough *embedding* of the circumferential edge, as shown in figs. 35 and 36. One of the weakest forms of mounting arises from the edge of the cover projecting *beyond* and *over* the outside of the cell, as shown in the section, fig. 37. It will be seen from this that as fast as the soft varnish is applied, it necessarily drains down *off the edge of* the cover, and leaves this altogether unprotected, as at A, unless indeed such a mass of cement be added as to make it a "bungle," and most unsightly and objectionable.

We now come to the completing process; but as the slides in the preceding state will be perfectly secure and not unsightly, they may be put aside until a considerable number shall have been accumulated, or they may be completed at once.

Although gum-dammar is sufficiently hard to resist indentation by the finger-nail, it is yet so remarkably brittle that it may be rubbed to powder between the finger and thumb; hence it will be necessary to add some toughening material, such as the drying oils, to make it durable enough for the outside coatings; and as the zinc-white used by artists is ground in poppy oil, which is of this nature, this material is well adapted to the purpose, and may be obtained in fourpenny tubes at any artists' colourman's; but it will be necessary to avoid putting in too much, as this will prevent the varnish from setting hard for a very long time. Should the zinc be very soft, or it be required to have a greater degree of opacity in the varnish, this may be obtained by first squeezing out the zinc on to a piece of coarse brown paper, and folding it several times over, and leaving it until the paper shall have absorbed out the greater portion of the oil. The preceding step will be almost indispensable with *Emerald green*, as this colour is mostly too soft to be used in its ordinary state.

The colours which have been found most suitable are: *Emerald green*, *French ultramarine*, *scarlet and crimson lake*, *aureolin*, *chrome-yellow*, *Chinese vermilion*, and *ivory-black*.

Purples and violets can be made with the lakes and ultramarine, while an infinite variety of the richest transparent greens can be obtained by the ultramarine and aureolin. Transparent colours on a pure white ground give the richest and most refined appearance, but for varying the effects it is sometimes desirable to introduce minute proportions of opaque colours, and a beautiful China blue may be obtained by adding a little white to ultramarine, and all may be rendered opaque by the addition of white.

To prepare the colours.—Having provided 6 or 8 one or two-drachm wide-mouthed phials (and if these be cut and polished on the top so as to admit of being closed air-tight with a piece of plate glass, it will be far preferable to corks), half fill each with pure colourless solution of dammar in benzole, and then add sufficient of the tube-colour to give the depth of tint required. But before using these colours it will be necessary to give the groundwork-coating of white to receive them, and in doing this a good body of the varnish must be put on and spread a little farther on to the slide, and on to the cover, than will be needed when finished, and then the whirling must be repeated in order to "spin" up a smooth surface. When this has remained for two or three days, and become moderately hard, it will then be ready for finishing. Having placed it on the turntable, and made it secure against slipping, take a sharp-pointed knife, or a flat-ended graver, and with this scrape or turn up the edges until smooth and sharp, and perfectly circular, and then wipe away the chips.

Having previously selected the several colours required, have these at hand, each one with its own brush on a long slender stick, and supported by a clip over the phial, *with the hair in the varnish*, so that it may be kept in proper working order, and (adding a drop or two of benzole every few minutes to the surface to counteract tackiness), proceed to apply the colours in succession until complete, when the whirling must again be resorted to to make the colours blend and settle down to a flat surface; and, if carefully done, every line will be perfectly concentric with the edges of the cell and with each other.

For brushes it will be necessary to select the

smallest which can be obtained; and although camel-hair pencils *will* do, sable would be infinitely better and more lasting. After using, each brush should be rinsed in benzole and wiped before putting away, and then be dipped in benzole again before using.

From a mere casual reading of the preceding instructions it might be imagined that the whole thing is a very tedious affair, and a great waste of time that might be more profitably employed. From such an opinion, however, I beg most strenuously to dissent; for "whatever is worth doing at all is worth doing well"; and if an object be worth the trouble of mounting at all, it is undoubtedly worth the expenditure of a few additional minutes to make it perfectly safe and lasting after it has been put up. The process naturally divides itself into two stages, the latter of which is unquestionably a "*just as you like*" matter, and the only part which can in any way come under such a stigma; but when it is stated that over three dozen have been "finished off" on a summer's morning before coming down to an eight o'clock breakfast, while an hour or two in the evening has sufficed to prepare an equal number for another morning's diversion, and has thus formed only an agreeable occupation for a part of the time which most people generally take for recreation, it can hardly be deemed a *wasteful* expenditure of time which possibly *might* be put to a better purpose, although it is very probable that in many cases it also *might not* be. But, with regard to the primary part of the process, however, this ought to be looked upon as indispensable and never to be neglected. With amateur mounters it is a common practice to put up several objects, and then, when covered up, to select such as it is desired to retain, and to transfer the rest to the duplicate box, either for distribution, exchange, or to be sent to the dealers; but to whatever destination they may be doomed, the "foundation" stage ought invariably to be completed, and in such cases it will be desirable to let the last coating of the foundation cement extend on to the edge of the cover for both security and appearance, and then into whosever hands they may fall, there will be no fear of insecurity, and any subsequent ornamentation may safely be left to the taste and fancy of the possessor. W. KENCELY BRIDGMAN.

Norwich, Dec. 1875.

AN OLD NATURALIST.

IT is with much pleasure that we notice the publication, by Messrs. Elliot Stock, of a facsimile reprint of the first edition, published in 1653, of Izaak Walton's "Compleat Angler." Paper, type, illustrations, and even the binding, are all restorations of the original book. This is one of the few works of the seventeenth century that Englishmen love to keep on their library shelves. Scores of editions, annotated and "corrected," have appeared since the "gentle Angler" gave his piscatorial experience, sagacious reflections, and semi-baccha-

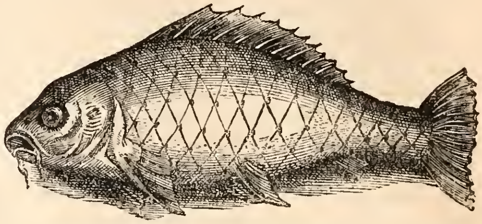

Fig. 38. Fac-simile of original illustration of Carp, in "Walton's Angler."

nalian songs to the world; but, for ourselves, we prefer Izaak Walton undiluted. There is a freshness of green fields and babbling brooks and cool shady dells about its quaint pages. They make

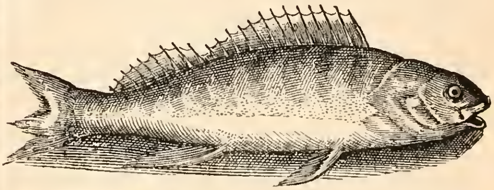

Fig. 39. Fac-simile of original illustration of Perch, in "Walton's Angler."

one long to get away from the study and the desk, to where the trout are rising, the lark singing, and the meadow flowers blowing! And then the clean-sanded kitchen, the well-cooked finny captures,

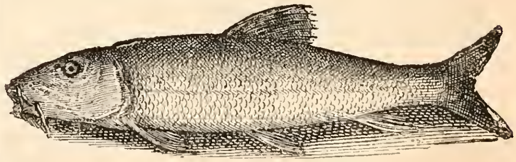

Fig. 40. Fac-simile of original illustration of Barbel, in "Walton's Angler."

seasoned with the healthy sauce of hunger; and the social glass and cheery companion afterwards! The "Compleat Angler" is not only one of the best books on the subject ever written; it is a valuable contribution to natural history as well. We have been allowed by the publishers to reproduce some of the facsimile woodcuts, and our readers cannot but be struck with their vigorous boldness and accuracy.

"The mode of reproduction amongst mollusca varies. Some, like the *Valvatidæ*, change their sex after a time, being at first male, and then female."
—*Harting's Rambles in Search of Shells.*

THE HEDGE-SPARROW.

(*Accentor modularis.*)

THE above-named little songster differs from some others of the same genus (*Sylviadæ*) by remaining with us throughout the year. At all seasons its pleasant and cheerful note may be heard. Whether in the depths of winter or height of summer, it is still to be found, hopping about from twig to twig, and uttering its short but plaintive song. It is very commonly distributed over our islands; frequenting the hedgerows and gardens, feeding upon insects, worms, and various kinds of seeds; and in the winter season drawing near to the dwellings of man, and there subsisting largely upon his generosity. In its character it is unobtrusive and harmless, deserving more protection and support from man than it generally receives. If you take a walk by the hedgerows in the early part of summer, you will be sure to make the acquaintance of the hedge-sparrow, then employed in domestic duties; and you may be certain that its eggs, or unfledged nestlings, are not far away. If you make a slight search, you will perhaps be rewarded by the sight of its beautifully compacted nest of twigs, moss, roots, and wool, with a plentiful lining of hair. Within are deposited its four or five eggs, of a deep bluish-green colour, entirely devoid of markings. Almost every country schoolboy can show you the eggs of the "Dunnock" (as it is often termed in the country), and it is a wonder that the birds are so common, especially when we consider the many accidents to which they are subject through their tameness, the eggs and young being so easily discovered by every wandering bird's-nester. It is in the nest of the unobstrusive hedge-sparrow that the egg of the cuckoo (*Cuculus canorus*) is most frequently found. The cuckoo and hedge-sparrows are there hatched together; the former, after several attempts, throws out the other nestlings, in order to receive the full supply of food, which the foster-parents are continually bringing to the nest. The hedge-sparrow is very sombre in appearance: head, neck, and throat, bluish grey; back and wings reddish brown, streaked with dark brown; breast and belly dusky white; tail slighlty forked; legs and toes orange-brown, claws black. The female considerably resembles the male in the colour of its plumage, with the exception of its being a little more spotted on the head and breast.

C. DIXON.

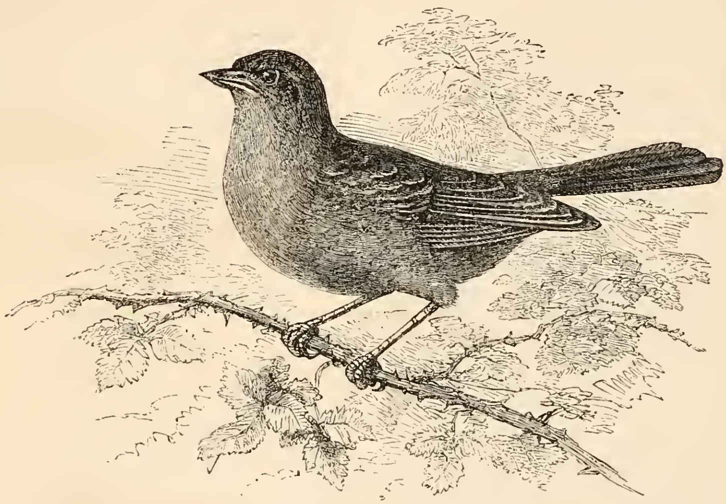

Fig. 41. The Hedge-Sparrow (*Accentor modularis*).

THE ORIGIN OF THE GREENSAND.

"If Mr. Stewart's argument were that all greensands have not yet been proved to have a foraminiferal origin, and consequently that we should be cautious in taking for granted that they have all been formed in the same way."*

I HAVE chosen to head my remarks with an extract from one of Mr. Brown's sentences, for the simple reason that, if he consent to delete from that text the words "have not yet been," and insert in their stead the two words "cannot be," if he consent to this reading, he and I are at one. It is not desirable that valuable space should be occupied with the reiteration of arguments that have been misunderstood; but it may be useful to point out some of the errors into which Mr. Brown has fallen, while penning his comments on my short note on "The Greensand and its Origin." In the

* A. J. Jukes Brown, SCIENCE-GOSSIP, No. 134.

first place, I may say that no one has been misled by Dr. Carpenter's expression, "the Greensand deposit of the Cretaceous epoch," which is a definite term, referring not to a greensand bed, but to the Greensand Formation as a whole. Again, my reason, marked categorically as number 2, had no special reference to the English Greensand, nor did it so appear from the context. I referred to the Greensand Formation in the same sense as Dr. Carpenter. It has been pretty well established, and is, indeed, admitted by Mr. Brown, that the casts occurring so abundantly in the Cambridge Greensand are derived from an older bed; and whether these derivative fossils retain their shells, or are mere casts, seems not to have any bearing on the argument. Mr. Brown must have read my communication in a hasty manner, otherwise he would not have made such an obvious mistake as to imagine that I considered that the fact of the absence of certain fossils from our Antrim greensands proves the non-existence of these fossils in any other locality. I never met with an Irish naturalist who was capable of such an assumption, and having enjoyed the pleasure of knowing some earnest and acute Cambridge naturalists, I think I may venture to affirm that Mr. Brown will not find any similar assumption in his own district. Dr. Carpenter, however, does not hedge his theory with any limitations, and, with all respect, it seems to me that it is necessary for his argument that *all* greensands should be constituted of glauconitic casts of foraminifera. The statement made by "authorities," that certain greensands which they have examined are so constituted, has been accepted by me already, as any one will see who glances at the conclusion of my former note; and it is not necessary that the party making such statement should be an authority in the sense of Mr. Brown; any trustworthy observer who gives an intelligible account of what he sees, is entitled to as much respect as an "authority." The Greensand of the North of Ireland is usually quite soft, and requires only washing and sifting to prepare it for the microscope; acids would not assist the investigation, and were not used in this case. Any one who has seen the beautiful series collected by Mr. Wright from our chalk flints will understand that it must be an easy matter to determine whether the grains of glauconite are fossil casts or amorphous particles. Mr. Wright's collection, made with great labour, from the chalk of this locality, numbers over a hundred species and well-marked varieties of foraminifera, distributed over 22 genera. The types are very diverse, and the distinguishing characters in many cases so decided as to render their detection easy, even were the test removed. While the microscope will not avail to separate casts of nearly-allied forms, it will, at all events, enable the observer to decide on the broad question of fact, as to whether the grains of the material under examination have been moulded in the interior of a foraminiferal shell. In one respect, I must claim the right to say something on this matter. I have not got my views at second-hand; before venturing an opinion on the subject, I took the precaution of trying to see "if these things were so"; not with a view to the matter in dispute. I made an offer of material to any who doubted my conclusions, or who very properly wished to examine for themselves. Several gentlemen availed themselves of that offer, I know not with what result, but any statement of theirs should at all events be received with respect. I am referred to papers by Mr. Sollas, F.G.S., which papers I read years ago. I have also read Mr. Seeley's paper on the subject,* to which I am not referred; but who states conclusions that seem much more in harmony with facts than those of Mr. Sollas. I have been in the habit of perusing the "Quarterly Journal" of the Geological Society of London, also the journal of the Royal Geological Society of Ireland, the "Geological Magazine," "Annals of Natural History," SCIENCE-GOSSIP, &c., and am of opinion that I could not have received much information on the subject from Mr. A. J. Jukes Brown, additional to what I have derived from these sources.

Belfast. S. A. STEWART.

HOLLY AND MISTLETOE.

LITTLE thought of during the rest of the year, at Christmas time holly and mistletoe take a position of importance, denied to them all the other months. The holly, as might be expected of a plant of its sturdy nature, boldly asserts itself, and is, at the season just passed, to be met with everywhere. In our churches it twines round the pillars, runs along the front of the galleries, and wreathes the pulpit; whilst on home and hospital walls, its shining leaves and bright berries gladden all, bringing to sick and well thoughts of past happy Christmases and hopes of future ones as blessed. Banished from churches, where, only by mistake, we are told, did it ever have place, Mistletoe has, in many houses even but an uncertain footing, for all do not look with favour on the privileges it brings in its wake. I propose to give a few facts concerning mistletoe and holly, taking the latter first. Holly (*Ilex aquifolium*) is an indigenous plant, growing also in warm and cold countries of Europe, Asia, and America. Although of slow growth, it attains, in a few instances, a great height, and forms, with care, after some years, handsome hedges. Evelyn had a fine holly hedge at Says Court, and I have seen one

* "On the Rock of the Cambridge Greensand."—*Geol. Mag.*, vol. iii. p. 305, *et seq.*

on the road from Birmingham to Acock's Green, about twelve feet high. Tynningham, near Dunbar, boasts the largest holly bush in Scotland, and at Frensham, in Surrey, some holly-trees reached a height of sixty feet. It is an interesting fact that, whilst the lower leaves are stiff and furnished with spines, which serve to protect the plant from injury from animals and other enemies, the new leaves at the upper part, having no share in the defence of the plant, do not possess this rigid character.* The wood is close and white, and stains well, taking especially a beautiful black. It is used for Tunbridge ware and wood engravers' blocks; box and pear-tree only exceeding it in value for the latter purpose. In very ancient times branches of it were fastened to houses to defend them from lightning, and as a protection from witchcraft. Later on the bark and leaves were used in fomentations, and the dried and not dried berries were reputed to possess very opposite qualities when swallowed. In my young days, when I suffered from chilblains, I was told that if I would only submit to have them whipped with freshly-gathered holly-leaves till the blood flowed, they would soon heal and never again appear. I had not the courage to try this remedy, but I believe it is still used in some country places. Birdlime is now made from the bark.

Holly is evidently a corruption of holy, — a name given from its use in some of the early Church festivals, when it was strewed instead of olive-branches. Its use at Christmas time can be traced to the Romans, who dedicated it to Saturn, and used it largely in the decorations for his festival, held at that time. The early Christians, therefore, whilst quietly celebrating the birth of our Lord, and keeping aloof from the riotous scenes around them, were wont to deck their walls with holly that they might avoid detection and punishment. Holly symbolizes resurrection. Great interest attaches to some holly-trees. In Argyleshire there is a prophecy that when a particular holly-tree near Inverary ceases to exist, and when certain other things shall happen (some of which have already come to pass), "then shall all the Argyle Campbells be destroyed, excepting so many as shall escape on a crooked and lame white horse"; and we learn from *Notes and Queries* that, in 1861, "the roots were exposed and loosened by the tide, and that the grandfather of the present Duke of Argyle insisted on an awkward bend being made in the line of public road to avoid the necessity of cutting it down." Near Dilston, in Northumberland, there is a thick holly-bush, consisting of several trees close together—the stems scored with initials and marks, and which is said to have served as a "post-office" for the passage of letters between the rebels and their friends in the troubled times of 1715 and 1745. A curious custom, called "holly bussing," was kept at Netherwitten on Easter Tuesday a few years ago, and may be now for all I know. The young people, headed by the parish clerk, playing the fiddle, betook themselves to a wood, where they gathered holly, with which they afterwards decorated a stone cross in the village, finishing the evening with dancing. Mistletoe (*Viscum album*) is a parasite growing on many trees; most frequently on the apple, and least often on the oak. So seldom, indeed, is it found on the latter tree that it has been doubted whether it ever attacks it; there are too many authentic instances, however, of its having been there seen for this doubt still to exist. Whilst it is found in France, Italy, Greece, and parts of Asia, it is said never to grow in Ireland nor in Devonshire.

Tradition says that this lovely English county, by some means, incurred the anger of the Druids, who cursed it, and forbade the mistletoe ever to grow there; and I have read, that, in an orchard lying partly in Somersetshire and partly in Devonshire, mistletoe was to be found plentifully in the Somersetshire part of it, whilst all attempts failed to propagate it in the unlucky county. As to the etymology of the word mistletoe, wise men disagree. Prior says it is derived from *mistiltan*, A.-S.: thus—*mistl*, different; and *tan*, twig; referring to the difference existing between it and the plant on which it is a parasite. Others assign the name to the manner in which it was supposed to be propagated by means of birds. Thrushes, blackbirds, and ringdoves are said to feed largely on the berries. All know how sacred the mistletoe was to the ancient Britons, and with what solemn ceremonies their priests gathered it, cutting it down with golden sickles, used only for that purpose, and never allowing it to fall to the ground. It was said by the Druids to be the winter home of the fairies, who found, under its leaves, the shelter they lost when other plants became bare. The priests distributed pieces of it to the people, as charms against witchcraft and many diseases. Great calamities were portended when no mistletoe was to be found on the oak; and it is probable that the reason why the Druids planted apple-trees near their oak groves was that they might remedy the defaults of nature when it so suited their policy. Shakespeare's mention of it as the "baleful mistletoe" is thought by some to refer to the horrid rites practised by the Druids when they gathered it; others interpret it to allude to the injurious effect it was supposed to have on the trees to which it fixed itself, or to the belief that the berries were poisonous. When and where the origin of kissing under it arose is un-

[* This is an exploded idea, although alluded to by Southey. The young leaves of the holly are soft and unprickly at first, wherever they grow, and become hard and prickly afterwards. The old leaves are not all shed at once, but are gradually replaced by young, which always appear soft and devoid of prickles.—Ed. S.-G.]

known, but it has been dated back to the ancient times when it was sacred to Friga, the Saxon goddess of love. At one time a youth could claim a kiss for each berry he plucked from the bush under which he stood with a maiden. Nares says that the maid who was not kissed under the mistletoe at Christmas, would not be married that year. Mistletoe was used in medicine for apoplexy, palsy, and other diseases; and that which grew on the oak was supposed to possess the greatest medicinal virtues, though Culpeper, a quaint old herbalist, says he knows not why, " unless because it is rarest and hardest to come by,"—an all-sufficient reason, to Culpeper, to account for the celebrity attained by many remedies. The bark is astringent, but is not now used in medicine. Birdlime is made from the viscid pulp of the fruit. R. M.

THE MICROSCOPE AND MICROSCOPIC WORK.

No. IV.—By F. Kitton.

HAVING glanced at the work done by one of the best observers of his time, we now proceed to describe some of the instruments that were from time to time invented to enable the inquirer into nature's secrets to pry still further into her *modus operandi*; but, although enabled by their aid to discover minute forms of life, they could not detect how life originated.

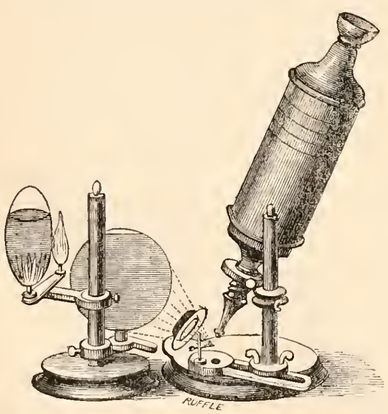

Fig. 42. Hooke's Microscope, with Lamp and Condenser (1664).

A contemporary of Leeuwenhoek's, and perhaps his equal in microscopic studies, was our countryman Robert Hooke, F.R.S. The instrument used by him was a compound one; and, as will be seen from the following drawing, could only be used for opaque objects. This microscope had three glasses, two composing the ocular, the third being the object-glass. These glasses were fitted to a compound body, consisting of four "draws," which could be pulled out like a telescope; when closed, the body was 7 inches in length and 3 inches in diameter, and could be inclined at any angle by means of a ball-and-socket joint. The field-glass

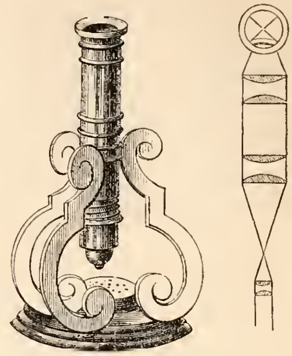

Fig. 43. Grindelius's Microscope (1702).

Hooke occasionally removed, as he thought he obtained more light and better definition (I have found it sometimes of advantage to remove the

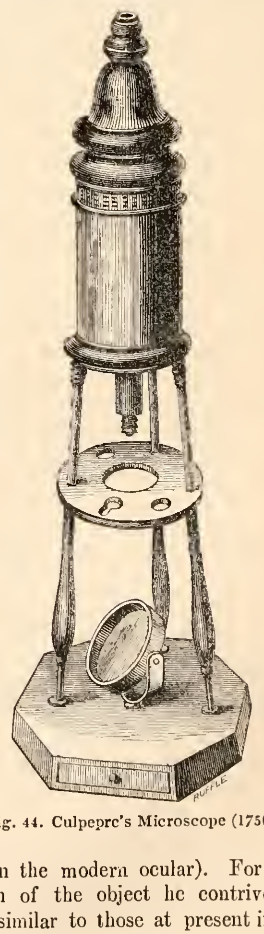

Fig. 44. Culpepre's Microscope (1750).

field lens in the modern ocular). For the better illumination of the object he contrived a lamp, somewhat similar to those at present in use. The rays from this were received by a globe of glass

filled with brine, and made to impinge on a small plano-convex lens attached to the base of the instrument, the concentrated beam falling on the object. Hooke thus describes his method of measuring the magnifying power of his microscope:—"Having rectified the microscope to see the desired object through it very distinctly, at the same time that

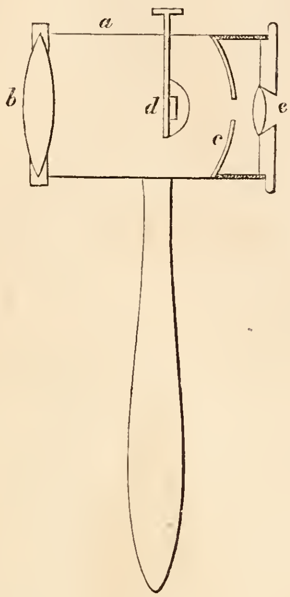

Fig. 45. Lieberkuhn's simple Microscope: *a*, short tube; *b*, convex lens for condensing the light on the speculum *c*, from thence reflected on the injection *d*; *e*, eye-lens for viewing objects.

I look upon other objects at the same distance with my other bare eye, by which means I am able by the help of a ruler divided into an inch and small parts, and laid on the pedestal of the micro-

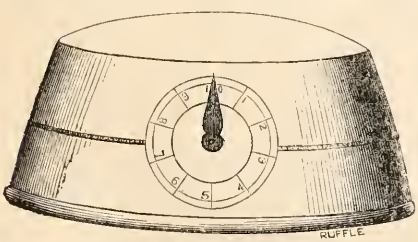

Fig. 46. Central portion of Ocular of Martin's Microscope.

scope, to cast as it were the magnified appearance of the object upon the ruler, and thereby exactly measure the diameter it appears of through the glass, which being compared with the diameter it appears to the naked eye, will easily afford the quantity of its magnifying."

To Hooke may justly be ascribed the invention of spherical lenses of high power. The following is his description of his method of making them:—"If you take a clear piece of Venice glass, and in a lamp draw it out into fine threads, and then holding the ends of these threads in the flame until they melt, they will run into a small round globule or drop, which will hang to the end of the thread. Having made a number of these, they are all to be stuck upon the end of a stick, with the threads standing uppermost; these ends are to be ground off fine on a whetstone, and then polished on a metal plate with tripoli. The lenses thus finished, if placed against a small hole made in a thin piece of metal and fixed there with wax, will both magnify and make some objects more distinct than any great microscopes can do."

Whilst Hooke was pursuing his microscopic investigations in England, Eustachio Divini, of Rome, and S. Campani, of Bologna, were also engaged in endeavouring to improve the microscope, and making observations with it. The former published a description of his instrument in the

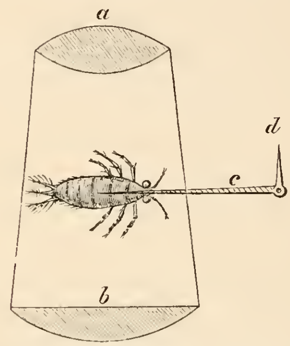

Fig. 47. Diagram of Micrometer in Martin's Microscope: *a*, eye-lens; *b*, field-lens; *c*, screw; *d*, index.

"Philosophical Transactions" for 1868; it differed from Hooke's in several particulars. Instead of a double convex eye-glass, he substituted two plano-convex lenses, which touched each other in centre of their convex surfaces. The advantage of this construction was twofold,—a flat field and great magnifying power. Chevalier, in his work on "Microscopes and the Method of using them," says that the compound body of this instrument when closed was 16 inches long, and as large in circumference as a man's thigh, and that the eye-glass was equal in size to the palm of the hand.

Philip Bonnani, in 1691, published his "Observationes circa viventia, quæ in rebus non viventibus reperiuntur, cum micrographia curiosa," a quarto, containing 445 pages and 68 plates. This is the work to which Leeuwenhoek alludes in his "Refutation of the Doctrine of Equivocal or Spontaneous Generation." In the following year, Bonnani published his "Micrographia curiosa, sive rerum minutissimarum Observationes quæ ope microscopii recognitæ et expressæ describuntur," 4to, pp. 106, plates 40. In the former work he describes his microscope.

The body was fixed on a stand in a horizontal position, and was provided with a stage for the objects. The body had a coarse adjustment by means of a rack and pinion moving the framework supporting the body, and a fine adjustment effected by means of a thread on the end of the body.

In 1702, Jean Zahn published at Nuremberg his "Oculus artificialis Teleodioptricus," in which he describes several compound microscopes, and gives a figure of the microscope of Francis Grindelius, of which fig. 43 is a copy. It will be seen that the optical part consisted of six plano-convex lenses, and like Hooke's, could only be used for opaque objects. Glass was not the only material used for the purpose of forming lenses. Mr. Stephen Gray, in No. 221 of the "Philosophical Transactions," describes the construction of his water microscopes: these were made of thin brass, about $\frac{1}{16}$ of an inch in thickness, in which a minute hole was drilled; a drop of water was taken up with a pin and placed in the aperture; the water retained its convex form, and, of course, magnified any object placed in front of it. This gentleman also made lenses of minute drops of isinglass dissolved in hot water. The investigations made by Leeuwenhoek with his simple microscopes was in great measure the cause of the neglect of the compound form, and many years elapsed before much attention was paid to these arrangements. The superior definition of the simple microscope compared with the hazy outline of the image as shown by the compound instrument readily accounts for the preference; the compound microscope was also cumbrous and unmanageable.

In 1738 Lieberkuhn invented the solar microscope, and the little concave reflector, now known by his name. He exhibited his microscope to some of the Fellows of the Royal Society. Mr. Cuff, an English optician, improved Lieberkuhn's solar microscope, by adding a movable reflector, by means of which the instrument became more available.

The injected preparations of Lieberkuhn were famed for their beauty, and, like Leeuwenhoek, he provided a microscope for each preparation. The diagram fig. 45 will illustrate the manner of viewing the object.

The drawing (fig. 47) represents the "Martin's microscope" as improved by Messrs. Cuff & Scarlett. This instrument was introduced in 1750, and very many of them must have been made, as they may now be occasionally seen.

About this time Benjamin Martin introduced his "Universal Microscope with a Micrometer." This instrument consists of a brass body fixed to an arm, with a ball-and-socket movement, by means of which the body was moved to the right or left; the stage was made to slip up or down the pillar supporting the arm, and was the only means of focussing the object.

We give a figure (46) of a part of the ocular to which the micrometer is fixed, and a diagram showing its arrangement, copied from a "Course of Lectures in Natural and Experimental Philosophy," by Benjamin Martin, Reading, MDCCXLIII. In the original drawing the screw is represented as tapering towards the point, but this is no doubt erroneous. Martin in the same work figures a "Pocket reflecting microscope with micrometer." * This resembles in make the non-achromatic toy microscopes of the present day advertised to magnify "10,000 times." It is not quite clear why he calls it a reflecting microscope, unless on account of the object being illuminated by reflectors. His diagram represents it as constructed with a bi-convex lens as an objective. Martin was the maker of the very elaborate instrument formerly belonging to George III., and purchased by the Royal Microscopic Society at the sale of the effects of the late Professor Quekett. A full account of this microscope will be found in vol. x. page 31, of the "Transactions of the Royal Microscopic Society." The following is the author's description of the objectives belonging to this instrument:—"Ten of them range from 4 inches to $\frac{1}{10}$ of an inch in focal length. These are also numbered from 1 to 10, No. 1 being the highest power. In addition to these, in one of the drawers are three higher powers, which appear to have been an afterthought. The focal lengths of these are marked respectively $\frac{1}{15}$th, $\frac{1}{20}$th, $\frac{1}{30}$th. There are also four powers marked $\frac{1}{10}$th, $\frac{1}{15}$th, $\frac{1}{30}$th, and $\frac{1}{40}$th, and numbered from 1 to 4. These last cannot be used with the compound body, but as single lenses only, and for their employment a small arm is provided, which fits on the back of the instrument, which can be turned round, and brought into proper position for use. The $\frac{1}{40}$th is the smallest ground lens; I have even seen it as scarcely larger than the aperture of its setting. There are also nine Lieberkuhns of various sizes, for viewing opaque objects, belonging to the instrument."

The following are the results obtained by testing the $\frac{1}{15}$th, $\frac{1}{20}$th, and $\frac{1}{30}$th, a scale *Morpho Menelaus* being used as a test object:—

The $\frac{1}{15}$ indistinct traces of lines, very ill defined.

The $\frac{1}{20}$ lined distinctly, but the definition anything but sharp.

The $\frac{1}{30}$ lined distinctly, but still without good definition; the amplification in all these cases being far beyond that which is necessary for bringing out the lines sharply with the present object-glasses of much lower power.

The very fine-lined scales of Lepisma were tried with the 30th; "very faint traces, amounting to a mere suspicion of lines, was all it would exhibit." This instrument has the following inscription

* The price of these instruments was, with micrometer, 21s.; without, 10s. 6d.

engraved upon it: "B. Martin Invt. et Fecit. London." It has no date upon it, but was probably constructed about 1770.

Benjamin Martin was of considerable repute as an optician and mathematician, and wrote several scientific treatises on various sciences. In addition to the treatises previously mentioned, he was the author of the following: "The Description and Use of a new invented Pocket Microscope," 8vo, pp. 29, plates 2. Chichester, 1738; "A New and Compendious System of Optics," 8vo, pp. 295, plates 34; "Micrographia Nova; or a New Treatise on the Microscope and Microscopic objects;" containing—

"I. The Description and Use of two different Reflecting Microscopes, of a new form and structure, and furnished with a Micrometer; viz., one designed for the Pocket, the other mounted on a Ball and Socket, which renders it of *Universal Use.*

"II. A large and particular Account of all kinds of Microscopic Objects to be found in the *Human body*, in *Quadrupedes*, in *Fowls, Fishes, Insects, &c.*, in *Plants* and *Vegetables* of every kind, in *Earth, Minerals*, and *Fossil Substances*, and various other *Miscellaneous Subjects.* With directions how to procure and prepare them for Use, and divers occasional Remarks interspersed thro' the whole. *To which is added* an Account of the Camera Obscura and Solar Microscope, or Method of *Magnifing Objects in a Darkened Chamber*, in every way by Reflection and Refraction."

I have carefully quoted the table of contents, in order that the modern "microscopist" may see what was the range of a work on "Microscopy" published 133 years ago. It contained 62 4to. pages, and was "adorn'd with Copperplates" (2), and the price was 2s. 6d.!

In the same year he published "*A Large and beautiful Print on Imperial Paper* (*Price Three Shillings and Sixpence*), *intituled*, Synopsis Scientiæ Cælestis, by Mr. Benjamin Martin, author of the Philosophical Grammar," &c.

In the earlier part of his life he appears to have kept a school in Chichester, but at last gave it up, and commenced optician and globe-maker at "The Sign of the Globe and Visual Glasses, two doors below Crane-court, Fleet-street, London," and which he carried on successfully for many years; but confiding in the integrity of those to whom he relinquished the active part of his business, he became bankrupt, and, driven to desperation, he attempted self-destruction, which though not successful, accelerated his death at the age of 78 years.

(*To be continued.*)

Butcher-bird.—A fine specimen (male) of this bird was shot at Craigo, in this neighbourhood, last week; very rare in this part of Scotland.—*R.B., Montrose Museum.*

MICROSCOPY.

New Cross Microscopical Society.—The New Cross Microscopical and Natural History Society held its occasional soirée at the New Public Hall, Lewisham High-road, on the evening of the 3rd March, and was one of the most successful meetings of the kind which the Kent or Surrey students of nature have ever been privileged to attend. The large room, so admirably adapted for a gathering, was well filled, without being inconveniently crowded, with about 500 visitors, while about 100 microscopes contributed to their instruction. Too warm commendation cannot be given to the excellent hon. secretary, Mr. H. A. Auld, of Blackheath, for the painstaking and admirable manner in which the "get-up" was managed. Mr. J. H. Steward, of the Strand, gratuitously lent a number of binocular and monocular instruments, besides some excellent graphoscopes and stereoscopes. During the evening there were two exhibitions of the oxyhydrogen lime-light in the upper lecture-rooms, illustrating sundry micro-photography and natural history objects, while in the large hall was shown a large and valuable collection of British and foreign lepidoptera and coleoptera (butterflies, moths, and beetles), zoophytes, shells, and corals, living lichen and flowers, and sundry curious specimens of pond life; amongst which was a brick-making melicerta. Almost every department of nature appeared to have been taxed to insure the success. This promising young institution holds its evening meetings at the hall the third Wednesday of every month at 8 o'clock. Besides a microscopic exhibition at these gatherings, it has its summer meetings, which are generally conducted by a scientific guide, who explains such phenomena as it has been decided previously to examine.

Liquid Cement.—"R. S. T." may purchase at any chemist's, compound tragacanth powder and powdered gum-acacia for a very small sum, and if these are mixed in equal proportions and moistened according to requirements at the time with dilute acetic acid, or, if the colour will not be of any importance, with ordinary vinegar, a strong and lasting cement will be obtained, which, as far as my experience goes, surpasses any of the cements now sold.—*W. G. Mackmurdo.*

Foraminifera.—Having received a slide containing foraminifera from Bantry Bay, it occurred to me to ask whether any one has given great attention to the question whether the species vary in the different localities, and if so, does it depend on the adjacent or submerged strata. Could you give an instruction how the foraminifera are to be obtained from the Greensand? I was much struck with a series at the Loophole, at Bath, from the

Greensand; but there is no one hereabouts who possesses the books of reference in which the secretary kindly hinted I might obtain my information.—*J. P. G.*

Glycerine Mounting.— Perhaps the slides which "S. L. B." has found defective were secured by merely removing all the superfluous glycerine possible, and then applying gold-size. In that case, I should not think the process would be reliable; but if the gold-size be kept from contact with the glycerine by a coating of amber dissolved in chloroform, I always find the gold-size to readily dry, and be quite trustworthy. If, just before filling the cell, the top of it be painted with amber varnish, and likewise the edge of the cover, they adhere when brought into contact, and the superfluous glycerine can be readily removed by a wet cloth folded into an angular shape. After being carefully dried, if the adhesion is faulty at any point, a few touches of collodion will effectually seal it up. Amber varnish should not be applied a second time, for of course it would soften the first coat.—*J. R. T.*

Polarization of Living Tissues.— A few evenings ago, whilst examining a living shrimp, I was rather surprised to find it affected by the Polariscope. At first I imagined that it was the thin carapace; but when this was taken off and put under the microscope it did not polarize. I then tried a thin section of the flesh, which had been previously boiled—this was again a failure; next, I tried a piece of the raw flesh, and was well rewarded for so doing, as its colours were most beautiful. Has any one else observed this?—*C. P. O.*

ZOOLOGY.

The American Manatee.—From the excellent memoir "On the Sirenia," by Mr. Southwell, in Science-Gossip, p. 56, I see that he has overlooked the notes on the *Manatus americanus* contained in my "Naturalist's Sojourn in Jamaica," p. 341, *et seq.*, the results of the personal observation of myself and my valued correspondent, Mr. Richard Hill. He is also evidently unaware that the Society for Promoting Christian Knowledge have published a figure of the species in their "Large Series of Natural History Engravings," the accuracy of which I can vouch for, as it was made after my own drawings, which were taken from the living animal.—*P. H. Gosse, F.R.S.*

Nesting of Hawfinch.—In answer to Mr. Alfred Bindon's question in the number of Science-Gossip for March, as to the Hawfinch breeding in Somerset, I can only say that it certainly does so occasionally in various parts of the country, but by no means frequently; indeed, when I published the "Birds of Somerset," I did not know of an instance. Since that, however, on the 26th of June, 1872, I had a young hawfinch sent to me from Fitzhead, near Wiveliscombe, in the western part of the county, that had just been killed by a cat; it was in immature plumage, and could not have left the nest more than a day or two, if so much. There is also a young hawfinch in the small local museum at Bath in the same state of plumage which I was told was killed near that town; and if so, it must have been hatched in the neighbourhood, as, like the other, it could not have been many days out of the nest. These are the only two instances that have come under my notice of the Hawfinch breeding in this county; indeed, it is not a very common bird even in the winter. Mr. Bindon does not say whether he has taken the eggs more than once in Somerset.—*Cecil Smith.*

Nilsson's Goby.—Having found a specimen of Nilsson's goby (*Gobius Nilssonii*) in the Moray Firth here in May, 1868, and as it is a new species to Britain, this being the first known to have been met with in our seas, I should feel greatly obliged by your recording the circumstance in Science-Gossip. When taken, I had ample opportunity for examination, and had it alive for two days. I could see that it differed considerably in habits especially from the other British gobies, and concluded on that account that it was a nondescript. But it may be naturally asked, why so long in publishing the fact? The answer is: When the little creature died, I then put it into a bottle to send it to Mr. Couch for his opinion. The bottle was very carefully put aside until I should get a letter ready to go along with it. This I wrote next day, but when the bottle was required, it was gone no one knew where. Although it was diligently and anxiously looked for, it could not be found. About three weeks ago I had the pleasure of again finding the lost bottle and my little rarity, and as fresh as the day it was put in, except the colours, which were gone. I now submitted it to Professor Nicol, Marischal College, Aberdeen, who identified it, and named the species for me. This species has only hitherto, and previous to its discovery at Banff, been met with on the coast of Norway. And I do not find it amongst those, twenty-five in number, mentioned in Dr. Turton's edition of Linné, published in 1806.—*Thomas Edwards, Banff.*

Sussex Heronries.—It is remarkable that Yarrell, in his enumeration of the counties containing heronries omits Sussex altogether, although when he wrote, the fine heronry at Parham had been for centuries established there. This has since been excellently described by Knox, and within the last three years a colony has been also established at Bosham, where, on the Bayeux Tapestry, Harold is represented with a falcon on his wrist. Can any reader inform me whether, at the present time,

there is any other heronry in Sussex?—*F. H. Arnold, LL.B., Fishbourne, Chichester.*

New Entozoon from a Fish.—In regard to Mr. William Wright Wilson's interesting communication on a parasitic worm infesting the small wrasse (*Crenilabrus rupestris*) sent to him by Mr. Hughes, permit me to say that it is evidently one of the many sexually immature nematoids whose precise generic relations must yet for a long while, I fear, remain unknown. Of course, it may turn out to be the juvenile state of *Prosthecosacter minor*, but it is just as likely to belong to a totally different genus. In the meanwhile it is best, perhaps, to place these doubtful forms in Diesing's genus *Agamonema*; and thus, since Mr. Wilson's parasite has not hitherto been described, we will call it, provisionally, *A. Wilsoni.*—*T. S. Cobbold, M.D.*

Porphyrio hyacinthinus in Somerset.—I see a note in the February number of Science-Gossip on the capture of the Purple Gallinule near Weston-super-Mare, in this county, with a question as to whether it is often found in this country. In answer to which, I may say that Mr. Harting, in his "Hand-book of British Birds," mentions only two instances of its occurrence in Great Britain, both of which he considers to have been escapes from some ornamental water: no doubt this was the case in the present instance. I am not aware of any other recorded instance of the occurrence of this bird besides the two mentioned by Mr. Harting. In spite of the wings not being adapted to long flights, as mentioned by your correspondent, it is nevertheless a migratory bird. Colonel Irby, in his "Ornithology of the Straits of Gibraltar," says, on the authority of Farier, that it is migratory at Tangiers, arriving in February and March, and returning in December and October. On the Spanish side of the Straits it appears only an irregular visitant, occurring in the neighbourhood of Gibraltar occasionally on migration. — *Cecil Smith.*

BOTANY.

Aquarian Flora.—I have the pleasure of giving particulars of a pretty appendage to the aquarium, namely, a floating flower-garden, which has been in operation about a month. I procured a piece of rough "virgin cork" (such as used for ferneries rustic work, also by photographers), about 9 inches long by 5 inches broad; thicker the more buoyant. Floated it to observe its position, then, from the highest ground, bored two holes about an inch or so in diameter, and a little distance apart, over which I placed two hyacinth bulbs; the roots soon reached the water. From the present healthy appearance of the leaves, I have every hope of the success of my scheme. The fish appear pleased with the addition, and have availed themselves of the shade offered by the Floating Garden.—*J.J.M.*

Colours of Flowers.—Your correspondent E. Edwards writes of the Scarlet Pimpernel (*Anagallis arvensis*), "It is, with the exception of the poppy, our only scarlet wild flower." I had always thought that the Flos Adonis, the Pheasant's Eye (*Adonis autumnalis*), was admitted to make up the trio of pure red British flowers, and though somewhat local, it is, I believe, sufficiently well established in many counties, Kent especially, to be reckoned a true British native. By the way, has it ever been noticed how remarkably few species or even genera there are that contain varieties of all the three (that we used to call) primitive colours? Thus, of Roses, we have plenty of red and yellow, but never a blue. Geraniums (not pelargoniums) show red and blue, but no yellow. Tulips and Dahlias red and yellow, but no blue, &c. The only flowers that I can at this moment call to mind, which present varieties in all three colours, red, blue, and yellow, are—Balsams (and there the blue is not pure), Hyacinths (none of the colours quite pure), Primroses (the blue rather lilac), and the Flax tribe, *Linum rubrum*, *Linum flavum*, and *Linum perenne*, which appear to come the nearest to pure colours of any. The Verbena once had a claim to be admitted amongst the class, as there was once a yellow variety (called *Sulfurea*), but it has been allowed to die out, and, I believe, has never been reproduced.—*C. B.*

Amateur Gardening.—I find it a capital plan, in a small Ward's case kind of greenhouse, to place pots and boxes on *inverted* pans; this keeps the floor dry, by allowing a current of air to pass below the pots, and protects the pots from being frozen to the floor on cold nights. Have any of your readers tried growing bulbs in pots half-full of quicklime, with the usual soil at the top?—*R. H. Nisbett Browne.*

Raphides in Enchanter's Nightshade.—The common Enchanter's Nightshade (*Circæa lutetiana*) is an interesting microscopical study, for its leaves, stem, and root are crowded with the peculiar plant-crystals called *Raphides*, of which Professor Gulliver has from time to time given descriptions in this journal. The cells of the pith of *Circæa* are filled with small transparent globular bodies.

Cladium Mariscus (R. Br.) in Arundel Park, Sussex.—This plant certainly is not wild in Arundel Park. Some years ago a not very large pond was converted into Swanbourne Lake, the banks and islands of which were planted with ornamental shrubs and plants. Amongst the latter were several of the more showy of our native species, and it is in every sense of the word a *garden*. *Helleborus*

fetidus (L.) and *Atropa belladonna* (L.) both grow in profusion there, but are not indigenous to the spot.—*Walter W. Reeves.*

The Cause and Prevention of Mouldiness in Fern-cases.—On looking over the back volumes of Science-Gossip, I observed inquiries respecting the *prevention of mouldiness* among ferns; but I also noticed that in the several replies not one contained a correct answer to the question. Some years back I met with the same difficulty, and did not let the matter rest until I had obtained a complete explanation of the whole subject. In an ornamental fern-case, standing upon a bronzed table, everything placed within it persisted in *not growing*, but in becoming covered with mildew and mould, and even the earth itself produced prolific crops of fungi, until at last it was suspected that some detrimental influence must be at work, either from material or construction, and on making a closer scrutiny, such was found to be the reality. The framework of the case being of zinc, and the bronzed table of iron, and as neither the bottom surface of the former, nor the upper surface of the latter had been painted, the two metals were in actual contact, and they formed a galvanic combination which proved to be the ruling cause, for on separating the metals by an insulating support of wooden bars, the plants at once became healthy and took to growing, and all symptoms of mildew and fungi entirely vanished, and have never made their appearance since. From this discovery it was at once perceived that *polar* influence was paramount in the laws of growth, and by the application of these principles it has been found that we possess a practical control over many of the "ills that flesh is heir to," both in plants and animals, while it has also given us a clue to the cause and prevalence of fungoid growths, and a ready means of overruling their production. Under one of the two polar conditions root-action is fostered, and when interfered with, fungoid growths are encouraged; while, by reversing the polarity, the latter disappear and atmospheric growth is promoted. Mildew in vineries has been overcome and banished, and by standing pot-plants on iron so as to excite polar action at the roots, an unusual healthiness has been obtained. By galvanic influence seeds have been made to germinate *heels upwards*, or with the radicle in the air, and the plumule downwards. Roses or other plants trained to iron stakes will be found to have their stems in contact with the iron blackened and killed; plants trained to galvanized wire fastened with iron nails become unhealthy and cankered, and numerous other effects may be traced to the same "galvanic" cause, the obvious remedy for which is to reverse the polarity, or to prevent it as much as possible by insulation and non-contact with the atmosphere. These experiments will be found more fully treated in the series of letters which appeared in the *Gardener's Chronicle*, commencing November 23, 1872, commented on in an editorial article, Dec. 14th, and continued Jan. 11, 1873, Feb. 1, Feb. 22, and March 8; and in which the long-desired connecting-link between the electricity of the atmosphere and organic life, and other polar effects upon inorganic matter are pointed out and explained.—*W. Kencely Bridgman.*

GEOLOGY.

Geological Record.—The volume of the "Geological Record" for 1874—the first of its kind—has just made its appearance, under the able editorship of Mr. W. Whitaker, F.G.S. All the papers bearing on geology and palæontology, published at home and abroad, during 1874, are ably catalogued and abstracted. Mr. Whitaker has been assisted by some of the best and most rising geologists of the day, and the volume is not only creditable to the industry of English geologists, but it is a most valuable necessity to a geological library.

The Ceratodus.—In reference to Professor Huxley's lecture on *Ceratodus* (Science-Gossip, p. 40), are your readers aware that there is, in the Bristol Museum, a unique collection of *Ceratodus* teeth from the Rhætic beds of Aust Cliff, near Bristol, associated with bones of the saurians? More than 400 different forms of these fossil teeth have been described under the name of *Ceratodus*, or *horned* teeth, from certain lateral prominences that render them remarkable. Mr. E. T. Higgins made the largest collection of these teeth, which was eventually purchased by special effort for the sum of £250, and added to this far-famed geological museum. No other portions of the fish were found, therefore the original nature of the *Ceratodus* could not be ascertained with certainty, even at the accomplished hands of Professor Agassiz, until, "in 1870, the Hon. W. Forster showed to M. Kreft, the curator of the Sydney Museum, a cartilaginous fish that lived in Queensland, and whose teeth corresponded in every respect with those of the fossil *Ceratodus*," except in size. It presents another interesting example of the *Dipnoi*, or double breathers, because it can breathe with lungs or gills, either separately or conjointly. It is an herbivorous amphibious fish, not exactly a true liver out of water, but occasionally works its way into the muddy banks, and when warm weather sets in buries itself in the mud, until the wet season returns. "It is worthy of note that the nature of the habitats of the fossil fish exactly corresponds with that of the recent. They lived in dismal, muddy flats, and buried themselves in lumps of clay, and using their lungs, breathed through a hole purposely made for communication with the

surrounding atmosphere. When the blocks are broken, the interior shows beautiful casts of the scales." The fossil teeth are much larger than the recent; whereas the latter are barely an inch in length, the former measure from two to three inches long. Here is another instance of a persistent type co-existent with the giant saurians, living on through countless ages, and now represented only by a diminutive species; true to the tooth in form and peculiar structure, but greatly diminished in size. But for the unexpected discovery of this curious living fish, we might have considered the singular fossil teeth extinct, and remained in ignorance as to their relative position and superstructure. The above measurements and quotations are extracted from an illustrated paper on *Ceratodus Forsteri*, by W. W. Stoddart, F.G.S., F.L.S., published in the "Proceedings of the Bristol Naturalists' Society," vol. i., part ii., 1874–5, where further information can be had. If any of your correspondents are wishing to know more of this most interesting animal, and have not access to the above book, and cannot experience the pleasure I did of seeing the fossil teeth shown and explained in juxtaposition with the recent stuffed specimen caught in Mary River, Queensland, I shall be happy to lend them the volume (name and address can be given in the exchange list of SCIENCE-GOSSIP if desired). The exhibition of these invaluable fossil *Ceratodus* teeth in the Bristol Museum is made still more interesting by a printed notice explaining their relation to, and discovery of, the stuffed fish, *C. Forsteri*, close by. This example is worthy of emulation.—*G. S.*

EVIDENCE OF A CARNIVOROUS REPTILE (*Cynodrakon major*, Ow.) ABOUT THE SIZE OF A LION.—At one of the recent meetings of the Geological Society, a paper on this subject was read by Professor Owen. The specimens described consist of the fore part of the jaws and the left humerus of a reptile obtained from blocks of probably Triassic rock from South Africa, forwarded by the late Mr. A. G. Bain, F.G.S. The upper jaw displays a pair of enormous canine teeth, much resembling those of *Machairodus*, being of a very compressed form, with the hinder trenchant margin minutely toothed. These is no dentated border to the fore part of the crown. No teeth can be detected in the alveolar border of the right ramus of the lower jaw, which extends about an inch behihd the upper canine. In the symphysial parts of the lower jaw the bases of eight incisors and of two canines are visible, the latter rising immediately in front of the upper ones, to which they are very inferior in size, and being separated by a diastema from the incisors. In this character, as in the number of incisors, the fossil resembles *Didelphys;* and in structure both canines and incisors resemble those of carnivorous mammals. The left humerus is 10½ inches long, but is abraded at both extremities. It presents characters in the ridges for muscular attachment, in the provision for the rotation of the forearm, and in the presence of a strong bony bridge for the protection of the main artery and nerve of the forearm during the action of the muscles, which resemble those occurring in carnivorous mammals, and especially in the Felidæ, although these peculiarities are associated with others having no mammalian resemblances. The author discusses these characters in detail, aud indicates that there is in the probably Triassic lacustrine deposits of South Africa a whole group of genera (*Galesaurus*, *Cynochampsa*, *Lycosaurus*, *Tigrisuchus*, *Cynosuchus*, *Nythosaurus*, *Scaloposaurus*, *Procolophon*, *Gorgonops*, and *Cynodrakon*), many of them represented by more than one species, all carnivorous, and presenting more or less mammalian analogies, for which he proposes to form a distinct order under the name of *Theriodontia*. The author further discussed in some detail the remarkable resemblances presented by these early reptiles, in some parts of their organization, to mammals, and referred to the broad questions opened out by their consideration. He inquired whether the transference of structures from the reptilian to the mammalian type has been a seeming one, due to accidental coincidence in species independently created, or whether it was real, consequent on the incoming of species by secondary law. In any case the lost reptilian structures dealt with in the present paper are now manifested by quadrupeds with a higher condition of cerebral, circulatory, respiratory, and tegumentary systems, the acquisition of which, the author thought, is not intelligible on either the Lamarckian or Darwinian hypotheses.

ANTIQUITY OF THE NORTH AMERICAN INDIANS.—Dr. C. C. Abbott, a frequent contributor to this journal, has an article in the February number of the *American Naturalist* on this interesting subject. Dr. Abbott has for years past devoted his attention to Indian pre-historic relics, and this article is a summary of his conclusions. He thinks that only comparative antiquity can be determined as to the Red men, there being no starting-point from which to begin a positive calculation. Although he believes the Indian races to have held possession of America for nearly forty centuries, he shows that they were preceded by an older race, similar in many respects to the Palæolithic men, who were displaced by the original Indians.

CHARACTERISTIC BRITISH FOSSILS.—Undoubtedly one of the best and cheapest books of its kind recently published is "Figures of Characteristic British Fossils," with descriptive remarks, by Mr. W. H. Baily, F.L.S., F.G.S., the acting palæon-

tologist to the Geological Survey of Ireland. This work appeared in four five-shilling parts, which brought the descriptions to the close of the Palæozoic system. These parts are now republished in one handsome volume. The illustrations are numerous and excellent, and the letterpress delineations clear, accurate, and fully instructive. We cordially recommend this work to all young geologists.

NOTES AND QUERIES.

TEETH OF A FLY.—If your correspondent "T. J. B." had either written to or called upon R. & J. Beck, from whom the slide "Teeth of a Fly" was purchased, it would have saved both him and his friends from the mistake into which they have fallen by imagining that the sliced ends of the spiral tubes at the end of the fly's tongue are sold as "the Teeth of a Fly." At the base of these spiral tubes (as any elementary work on the anatomy of the fly will explain), there are several horny appendages with sharp, knife-like edges, which are no doubt well shown in the specimen to which he refers, and are known as the teeth. If "T. J. B." will carefully re-examine the slide, he will see, and be no doubt able to convince his friends, that the purchaser of this object has neither been "defrauded" nor had "palmed off" upon him any preparation under a false pretence. It is a great pity that persons do not make rather more inquiry before committing themselves in print to expressions likely to subject them to legal proceedings.—*R. & J. Beck.*

TEETH OF A FLY.—I beg to inform "T. J. B.," in answer to his query in last month's SCIENCE-GOSSIP, that flies have teeth, and that if he looks more carefully at the slide of his F.R.M.S. friend, he will probably see them as bidentate rods, situated between the bases of the so-called pseudo-tracheæ, which are really suctorial channels. In the Blow-fly there are three rows of these teeth, and, consequently, thirty in each lobe of the lips, or sixty in the whole organ. If "T. J. B." will soak the proboscis of a blow-fly in liquor potassæ for a week, cut off the lips, and then tease them out with fine needles under the dissecting microscope, he will be able to expose the teeth, and satisfy himself as to the facts. The fly *is* a suctorial insect, but the teeth are used to triturate the sugar or other food, which then being liquefied by the saliva is sucked up through the suctorial channels and the proboscis. If "T. J. B." will look at page 332, vol. i. of the *Monthly Microscopical Journal*, he will find a capital drawing of these teeth by Mr. Suffolk, from a mounted preparation I made and sent to him. He can also consult Mr. Lowne's excellent work on "The Anatomy of the Blow-fly."—*Major Lang.*

THE TEETH OF FLIES.—The communication of your correspondent "T. J. B.," who, in the last number of SCIENCE-GOSSIP expressed his anxiety to be informed whether flies have teeth, set me to look up authorities on the subject; and with your permission I will give the result of my researches. Mr. Suffolk contributes an illustrated paper "On the Proboscis of the Blow-fly," to the *Monthly Microscopical Journal* for June, 1869, in which he says:—"The pseudo-tracheæ above and below the oral aperture are arranged in four groups, each connected with a larger tube, these four main tubes emptying themselves into the oral aperture; the ten central tubes on each side of the mouth open directly and independently, having disposed between them long forked appendages; *the teeth*, arranged in three rows, the back row of which perhaps are hardly to be considered as proper teeth, as they are attached rather closely to the membrane of the lips. The office of these teeth is undoubtedly that of cutting instruments or scrapers. I have examined caraway comfits after flies have fed upon them, and found them covered with parallel scratches, the distance of which, when measured with the micrometer, corresponded exactly with that between the teeth." Respecting the teeth of *Musca domestica*, Captain Lang remarks, "That there appears to be only one row, each tooth considerably broader than in *Musca vomitoria* and tridentate; and on either side of these principal teeth may be seen a very delicate one, so that there are the same number as in the blow-fly, though differently arranged." Again, Mr. Lowne, in his monograph on "The Anatomy and Physiology of the Blow-fly" (pp. 47, 48), writes:—"The anterior surface of the lobes (of the proboscis) is channelled by a series of canals, kept open by incomplete rings, called false tracheæ, which open internally into the cavity between the lobes, and so into the mouth: these form a fine strainer, through which the insect is enabled to filter the fluids from the solid portion of the substances on which it feeds. The lobes are, however, capable of further separation, exposing the triangular opening, which is surrounded by from *fifty to sixty bidentate rods or teeth*, which are usually concealed between the posterior portions of the lobes, but are used, when exposed, for grinding hard substances, such as sugar; so assisting the salivary secretion to dissolve them." Possessing a slide similar to the one described by "T. J. B.," labelled by Messrs. Smith & Beck, "Teeth of a Fly," I have again examined it under a one-third objective, with B eye-piece; and I must confess my inability to discover the teeth as figured by Mr. Suffolk. The false tracheæ have a rasping surface, apparently quite capable of making marks upon sugar; and it has occurred to me (subject to correction by more experienced investigators) that the preparer of the object in question has mistaken the false tracheæ for teeth.—*John Ford, Wolverhampton.*

MISTLETOE ON TREES.—In reply to "R. S. T.'s" question, in the February number of SCIENCE-GOSSIP, I am able to inform him that we have a fine bunch of mistletoe growing on an acacia in our garden in Sussex.—*E. S. G.*

MISTLETOE.—I have known mistletoe to grow on a pink May-tree in Surrey, in Hampton Wick: could any of your readers tell me if it is generally known?—*J. W. Mee.*

MISTLETOE.—As supplemental to the trees mentioned by your correspondent "R. S. T." as supporting mistletoe, allow me to direct his attention to the article *Viscum*, in "The Treasury of Botany": we there read that "next in frequency to the apple, the mistletoe prefers the poplar; though it is not found on the Lombardy poplars; hawthorns, limes, maples, and the mountain ash are all favourite habitats for the plant. It has been found on the cedar of Lebanon and on the larch." In the Kew museum there are British-grown specimens upon maple, hawthorn, and hazel, and upon *Sorbus sp.* and *Acer opulifolium* from Mentone.—*John R. Jackson.*

THE MISTLETOE.—"R. S. T." requests your readers to supplement his list of trees which support mistletoe. In this neighbourhood I have found it growing on apple, poplar, hawthorn, common willow, and the tree commonly called acacia, but which I believe is a *Robinia*.—*H. L. Graham, Bishop Frome, Herefordshire.*

THE MISTLETOE.—Referring to the note on the mistletoe by "R. S. T.," in SCIENCE-GOSSIP for February, it may be found (or a few years ago might have been) growing abundantly on a large hawthorn in a field adjoining Black Park, near Langley, Bucks. I do not know how rare or frequent this may be, but it is not among the trees named by your correspondent as those upon which he has observed the mistletoe parasite.—*C. F. W.*

THE MISTLETOE.—I would refer "R. S. T." to some interesting observations in the *Gardener's Chronicle* of January 29, by J. Rust, Eridge Castle, Tunbridge Wells, which inform us that the mistletoe is growing on the common azalea at Eridge Castle. The plant was first noticed about ten years ago, and it continues to increase every year; it appears to be about fifteen years old, but how it came there no one knows. The letter is full of other interesting matter, and well worthy of perusal. I should fancy this growth of mistletoe on azalea is the only instance on record.—*John Colebrooke.*

THE MISTLETOE.—Since sending my inquiry last month, I find that SCIENCE-GOSSIP for December, 1875, contains a list of trees which support the mistletoe: it is taken from a paper by Dr. Harley, communicated to the Linnæan Society. The list is as follows:—Maple, walnut, plum, false acacia, cherry laurel, Portugal laurel, hawthorn, apple, crab, almond, lime, olive, ash, poplar, willow, pear, elm, fir, larch, oak, and beech. This list leaves the question open respecting the mountain ash; it may or may not be included under the term "ash." In the same number of SCIENCE-GOSSIP, a note about its growth on the mountain ash is mentioned, with some unusual facts respecting this parasitic plant.—*R. S. T.*

THE MISTLETOE.—By way of a supplement to "R. S. T.'s" list, I will name the service, pear, hawthorn, willow, and walnut trees as *habitats* for this plant.—*H. E. Watney.*

NOTES ON THE BIRDS OF MAIDSTONE.—On referring to a book published in 1839, I find that the osprey, buzzard, hobby hawk, and merlin were to be found near this town; but, now, I know of no other hawks to be found here than the kestrel and sparrow-hawk. The same book says the heron and bittern were occasionally seen here. I have heard of the heron being shot at Snodland Marsh, and also the bittern; but the latter bird is rarely seen, and it was some years ago when this one was shot there. There are two or three heronries in Kent, so that it is quite probable that this bird strays as far as Maidstone occasionally. The hooded crow, raven, hoopoe, great grey shrike, night-jar, landrail, quail, snowy owl, golden plover, kingfisher, great woodpecker, spotted woodpecker, lesser woodpecker, tree-creeper, ring-ousel, hawfinch, common crossbill, and several others, are mentioned in this book, that were either shot or observed in these parts. I will now make a selection of the above birds to be seen here at the present time. The landrails is, I am afraid, scarce (at least near this town). I used to hear it in a field here, but it is several years since I have heard its grating noise. The golden plover is, I believe, common on the marshes and hills at Burham and Snodland. Kingfishers are, I have reason to believe, rather less rare than formerly. I have seen them several times this past year, 1875, on the banks of the Medway, and in the streams along Loose Valley. I saw a green woodpecker last year in the Maidstone cemetery. The tree-creeper is not uncommon. Kent is rich in warblers, and the sweetest songster of that family, the nightingale, may always be heard close to the town in the summer. Nearly all the other warblers are common near Maidstone. I have at present only discovered three of the tits, viz., the great tit, longtailed tit, and blue tit. I observed more yellow wagtails last summer than formerly. In the winter large flocks of seagulls visit this place, and occasionally wild ducks may be seen. And, now, not wishing to encroach on your space, I take leave of the subject for the present.—*Henry Lamb, Maidstone.*

NOTES ON PLEOMORPHISM.—In the February number of SCIENCE-GOSSIP the writer of the interesting "Notes on Pleomorphism" refers to De Bary's *Myxomycetes*, and confesses that inasmuch as these fungoidal spores exhibit at one period of their life-history every characteristic of the animal family *Amœbæ*, the consequences of such observations are so startling that on less authority we should be inclined to doubt their accuracy. Certainly for a vegetable to present the appearance of an animal form is startling; but is it more wonderful than the fact that certain cells of the animal body should possess the power of motion by means of their cilia after they have been detached from the body, and even when that body is dead and putrefying? In the words of Dr. Carpenter, "the motion of the cilia is not only quite independent (in all the higher animals at least) of the will of the animal, but is also independent even of the life of the rest of the body. Thus, isolated epithelium-cells have been seen to swim about actively in water, by the agency of their cilia, for some hours after their detachment from the mucous membrane of the nose; and the regular movement of cilia has been noticed fifteen days after death, in the body of a tortoise in which putrefaction was already far advanced. In the gills of the river mussel, which are amongst the best objects for the study of this most curious phenomenon, the movement endures with similar pertinacity."—*W. F.*

KYNIN, KEENING, OR KENNING STONE.—A small round stone found in Devonshire, about the size of a cherry,—a red-brown colour; indeed, it closely resembles a red cherry in the early stage of rotting. There is a peculiar virtue attached to this stone; according to the superstition, it is able to cure sore and diseased eyes, and is eagerly sought for by the country people. Can any reader of SCIENCE-GOSSIP give me the correct way of spelling the name, its origin, and any further particulars they know about it?—*R. M. Latham, Disraeli-road, Putney.*

FOLK-LORE RESPECTING THE NETTLE.—Bee-keepers still plant in some country places a nettle or two near the hives. One old woman I knew assured me that if the bees saw a frog in the vicinity they would not swarm; so, she added, "I always keep some sting-nettles growing in my garden, 'cause them frogs can't abide the sight of one."—*H. E. Watney.*

Folk-lore of Plants.—In reference to the "local names" of plants, the following quotation from "The Complete Angler" may not be uninteresting to some of the readers of Science-Gossip. This passage was, I believe, discussed some years since in the "Journal of Horticulture," and is thus expressed in Isaak Walton's "Complete Angler."

"So I the fields and meadows green may view,
And daily by fresh meadows walk at will,
Among the Daisies and the Violets blue,
Red Hyacinth and Yellow Daffodil,
Purple Narcissus, like the morning rays,
Pale Gander-grass and azure Culverkeys."

Has any one identified these two last-mentioned plants, known then by these names probably in Staffordshire, where Walton was born, and resided when he became an author? With regard to the latter, we must note down a jocular reply,

"Culverkeys,—Culverkeys,
Why! they are Pigeon Peas."

"Culver" was the old Anglo-Saxon word for "dove," or "pigeon," and "key" is a seed-vessel. A botanical friend suggests that this name refers to a species of the Vetch family, now included under the genus Lathyrus (tuberous pea), forming part of the old genus Orobus, and called *Orobus tuberosus*. The flowers of the vetches for the most part are blue or azure, and the vessel containing the seed much shaped like a key. As regards the name "Gander-grass," we presume it refers to the *Galium Aparine*, "goose-grass," which derives its English name from the avidity with which the young stems and leaves are eaten by geese; and, as a matter of course, if geese eat them, ganders must also do so. This species of Galium is also called Cleavers, on account of the tenacity with which the fruit adheres to any rough or soft substances. The flowers are of a white colour; hence Walton's term "Pale Gander-grass." We do not quite understand what flower Walton means by "Purple Narcissus, like the morning rays," unless he applies that name to the Early Purple, or Meadow Orchis, whose flowers are mostly of a rich purple, and would be out with the Daffodil. Isaak Walton must also in his rambles along the river Dove, have met with the rose-coloured wild hyacinth mentioned in the interesting paper on the "Variations of the Colours of Flowers" in last month's Science-Gossip, p. 41, by F. Casson. I once found, some years since, the rose-coloured wild hyacinth at the foot of Snowdon, North Wales.—*E. Edwards.*

Foreign Escapes.—The following short botanical notice may prove interesting. Staying with some friends at St. Leonards last September, I went with them to pay a visit to Hollington church and churchyard. I wandered into the little coppice known as Hollington Wood, which surrounds the churchyard, and of which it is only a clearing, in search of any late autumnal wild flowers to add to my collection of coloured drawings of wild flowers. I soon found a plant growing very freely in the wood, and apparently like any other plant there, quite wild, which attracted my attention as one quite new to me. I gathered a good deal of it, and took it home, and as usual made a coloured drawing of it as accurately as I could. Unfortunately it was in seed, and on no single piece could I discover a flower in perfection; the seeds shattered about me as I drew it. I searched my botanical books, and was convinced that it was a species of amaranth, but still certainly not the only English species of that order, *Amaranthus Blitum*. It struck me from the first as very like Prince's Feather. The flowers were crowded on dense lateral and terminal spikes, the leaves shining on the whole plant, strongly tinged with crimson. It had no corolla that I could detect; a calyx and leafy bract very like the sepals of the calyx; each flower had one flattened round black seed, which, as I said, fell in quantities while I was drawing the plant. It grew so abundantly in the wood, that for some time I never suspected it was not a wild plant, I only thought I was too ignorant a botanist to make it out; but upon my return to London I showed my drawing to a friend who belongs to the Linnean Society, and who, on comparing my drawing with botanical drawings belonging to the society, came to the conclusion which I had previously suspected, that it was a foreign amaranth escaped from a garden, and naturalizing itself in the locality in which I found it. I have now little doubt that it is *Amaranthus polygamus*, from comparing it with an engraving of that plant in Knight's Encyclopædia, which exactly resembles my drawing. So many of the graves in the churchyard, only a few yards from the place where I found this plant, are planted with flowers, that its presence there may be easily accounted for, but I thought the fact interesting as showing how easily plants disperse themselves, and become naturalized in countries far from their native habitat.—*F. M. K.*

Lobsters.—Lobsters use their feet to climb and walk with, and their wide tails are so constructed that they can spring backwards with considerable force by their aid. They have false feet, which they never make use of in swimming, though they occasionally do in burrowing; also in setting the water in motion all round them. Lobsters cast their armour, or shell "moult," as fishermen say, and are for a few days quite helpless, the new shell being so soft. Persons who watch the habits of *Crustacea* in large aquariums, say that the lobster, being well aware of its approaching change, goes and burrows under a piece of rockwork, throwing up a sort of fortress of shingle and sand, behind which it retires during the operation.—*H. E. Watney.*

Dog eating Wasps.—Most probably the terrier mentioned by "S. M. P." in Science-Gossip for February, had been stung by a wasp on some previous occasion, and, neither having forgiven nor forgotten, the conduct described may be attributed rather to a desire for revenge than to any great appreciation of the merits of the wasp as an article of food. The case is much the same as that of an intelligent Scotch collie, who was my constant companion for several years of my boy-life. We were one day passing a bee-hive, with the bees hard at work, when, suddenly inspired by a spirit of mischief, I drew the dog's attention to it. The poor fellow trotted unsuspectingly forward to have a closer inspection, but no sooner did his inquiring nose approach the entrance than he received a sting in it which made him effect a hurried and undignified retreat. From that day he kept at a respectful distance from a beehive, but woe to the bee who came within his reach elsewhere! There was no mercy shown, and the execution was summary, for he evidently regarded the matter as a serious one, and not in any way as an amusement. I do not now remember whether or not he ate his victims, but most likely he did. I may add that in the act

of capture and killing, his lips were invariably drawn back as much as possible, which showed his knowledge of the stinging danger.—*D. R.*

Tadpoles of Newts.—I am sorry to say I have never taken advantage of any opportunities I may have had for making the acquaintance of the newt family; but on reading "H. E. F.'s" instructive paragraph in Science-Gossip for last December, I saw, on reaching the concluding sentence, that there was some mistake. A careful perusal of the context showed that the apparent contradiction was owing to an error in copying or printing; and that the eighth line from top of column should read "The tadpole of the frog," instead of "The tadpole of the newt."—*W. R. H.*

Bats.—On Christmas-eve of last year, I saw by the light of a street lamp, some bats flying about an open space close to the town. On the 28th Dec. I saw a bat flying about one of the principal streets in broad daylight, though a very dull day; and on the 29th, a fine specimen of the long-eared variety was caught flying about a leather-warehouse belonging to a friend of mine. This curious waking up among the bats was, I suppose, due to the extraordinary mildness of the season. I noticed also many flies in the fields.—*W. A. Law.*

Late Martins.—Our correspondent "J. L. H." should read White's "Selborne," in which he will find the migration, and supposed "hybernation" of these birds fully treated on, although no proof of the latter has been established. It has occurred to me as being possible, that the late martins occasionally seen, may be birds hatched so late in the season that they do not migrate, and may perhaps fall victims to the severity of our winter.—*Dr. Morton, New Brompton, Kent.*

Note on Asparagus.—In the course of some inquiries I have been making with reference to the old market-gardens of London, I have noted some facts concerning the early culture of asparagus; and places nearer the centre of the metropolis than those named by Mr. Glasspoole might have been cited as producing it. Thus it was grown to a good extent in Lambeth, from whence it was easily carried across the Thames to the markets about the Strand. Also it was cultivated in the district near what were called "Neat-Houses," lying between Westminster and Chelsea, once a favourite resort of ruralizing citizens; afterwards these rather marshy fields became the possession of market-gardeners; and now the land is elevated, and bears "South Belgravia" upon its surface. When Dutch William arrived on our shores, no doubt, an additional quantity of asparagus was cultivated; for the vegetable was much favoured at court, and the public would follow suit. And yet the monarch was decidedly economical, since, as Swift's biographer tells us, it was his habit to eat, not the tops merely, but the entire stalk; and such a practice would surely at last lessen the consumption of the plant. Swift himself, with his usual eccentricity, did, as his friend Faulkner narrates, insist on his visitors following the royal example, and sent back plates presented for a second "help," until the stalks were cleared.—*J. R. S. C.*

Twin Birds.—In a recent number of the *Animal World* there appeared a note under the above heading, which struck me as being of such uncommon occurrence, that I here insert it:—"Did you ever hear of two canary-birds coming out of one egg? I have a fine dark cock which paired with an equally fine gold-coloured hen, and in due time two eggs were deposited in the nest. Whenever the hen would permit me, I peeped into the nest to satisfy myself that the eggs were safe, and certainly there were only two. After they had been hatched a week, I discovered one morning, to my intense surprise, that there were three young ones in the nest. They are now more than five weeks old, very fine birds, and equally fledged. The two I presume to be twins are singularly marked; one having the right wing dark, with the left one yellow, while the other is *vice versâ*, both having dark heads and yellow tails." I should be very glad if any of your numerous correspondents or contributors could inform me, through your columns, if any of them have ever experienced such a peculiarity, or whether it is of common occurrence.—*C. P. Hall, Woolwich.*

Juniperus communis.—"W. P.," in your February number, expresses surprise at the common juniper being described as attaining to a height of ten to fifteen feet at Mickleham. Of this shrub, in that district, I have no knowledge; but, unless my memory deceives me, I have met with it growing to a height of ten to twelve feet, or even more, in the neighbourhood of Burnham Beeches. On referring to my notes of a visit to that beautiful spot in August, 1872, I find that I have not recorded the height of any of the specimens I saw, but this is a matter which any of your readers living in the vicinity could easily set at rest. It is somewhat plentiful on East Burnham Common; but, I think, is not more than three or four feet high there. The larger shrubs will be found on the north-west side of the celebrated Beeches, on that part of the open forest land named in the Ordnance map Crabtree Heath. In a book I have before me, called "Sylvan Sketches," the author says:—"*Juniperus communis* seldom exceeds three feet in height. . . . Though its growth is so very humble in a wild state, it will grow fifteen or sixteen feet high if planted in good soil." W. S. Coleman, in "Our Woodlands, Heaths, and Hedges," says:—"In its wild state, and that in which it is usually met with, the juniper is a low shrub, seldom more than three feet high; but when planted in a very favourable soil, it will often rise to the dimensions of a tree. At Wardour Castle, in Wiltshire, is one (the largest in England) thirty feet in height." The size of the beeches at Burnham is, I presume, evidence of the fertility of the soil at that spot, and it may be that the Mickleham junipers grow in an equally favourable situation. It would be interesting to know if, in the latter district, the large shrubs are found in close proximity, or if they are scattered over a good stretch of country. If they grow only in one spot, are there other junipers in the neighbourhood, and how do they compare with the specimens in question?—*Martin Gardner.*

Communications Received up to 10th ult. from:—Dr. W. J. H.—R. G.—R. H. N. B.—J. P. G.—L. H.—Dr. T. S. C.—J. J. M.—G. S.—W. L. S.—S. A. S.—G. C. D.—W. W. R.—R. M. L.—H. G. G.—C. P. H.—H. A. A.—F. M. K.—F. A.—H. M. J. U.—J. P.—J. S. H.—C. P. O.—W. G. M.—R. G.—J. W. D.—W. J.—E. S.—C. W. C.—C. S.—E. S. C.—C. W. C.—J. B.—M. B. D.—Dr. C. C. A.—E. L.—J. M. M.—Dr. G. D. B.—J. R. T.—C. B.—T. E.—O. H. W.—W. D.—W. J. H.—H. C. C. M.—F. H. A.—W. G. B. P.—E. M. B.—C. P. H.—E. F. J.—C. S.—E. S.—E. J. B.—R. H. N. B.—E. H.—T. C.—J. S. C.—H. E. F.—G. S. T.—W. T.—H. W.—W. G.—H. R.—W. S. S.—C. J. J.—W. H. G.—J. A. jun.—J. H. B.—E. H.—F. A. A.—P. H. G.—J. B. B.—T. G. B.—F. C.—G. G.—W. D. E.—M. E. P.—J. W. B.—C. D.—R. T. S.—J. L. J.—G. J. J.—S. R.—R. C.—A. W.—M. P. M.—A. H.—&c., &c.

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

J. L. J.—It is quite a mistaken idea that a great reward has been offered for the discovery of "Perpetual Motion."

S. Radcliffe.—Get Swainson's treatise on "Taxidermy"; it may be obtained from most second-hand booksellers, and will give you all the information you need.

T. W. Dealy.—Your "French Butterfly" was very likely a "Tortoise-shell" or "Peacock," which had escaped hybernation.

E. S.—The specimens of twigs of Hawthorn, &c., on which the "curious formation" was found, were covered with the dried bodies of a species of *Coccus* which has been introduced into this country. It is nearly allied to the Cochineal insect, and, like the latter, the body of the female serves as a kind of cocoon under which the eggs are hatched. It goes by the name of the "Scale Insect."

M. B. D.—The specimen you inclosed is certainly not a moss. It is too difficult to specifically make out, but it seems to be a species of *Jungermannia* or "Scale-moss." It is not worth mounting.

J. Barrett.—The intestinal worms which caused the death of your blackbirds were most likely the *Echinorhyncus gigas*, one of the "Thorn-headed" worms, belonging to the order *Acanthocephala*. They are found in mammals and fishes, as well as birds, but have not hitherto been found in man.

Erratum.—In Jan. No. of Science-Gossip, p. 12, first column, the 28th line should read, "in the 6th vol. of *The Popular Science Monthly* (New York)," instead of "this magazine," as printed.—C. C. A.

C. M. (Southport).—The red and black seeds are those of *Abrus precatorius*, or "Wild Liquorice," a leguminous plant. The pretty seeds are used in the West Indies for beads. The yellow glistening objects appear to be the empty egg-cases of some insects.

E. H. W.—Gwyn Jeffrys and other conchological authorities say nothing about the existence of any structural differences in the sexes of the *Anodonta*. Perhaps some of our correspondents will answer the question.

Notes on the Diptera.—Erratum.—On page 60, at the 15th line from the beginning of the paper, for Despunculidæ, read "Pipunculidæ."—F. J. A. and H. M. J. U.

T. E. Blomfield.—The Section-cutter described in last month's number has not yet been advertised. We were under the impression it was inserted then.

F. Kyflofler.—The food of the caterpillar of *Bombyx* (*Attacus*) *yami-mai* is the leaves of oak.

E. Lamplough.—Your moss is *Bryum argenteum*.

L. Hayes.—The specimens are as follows:—1. *Bartramia fontana*; 2. *Hypnum aduncum*; 3. *H. fluitans*; 4. *Fontinalis antipyretica*; 5. *Frullania tamarisci*; 6. *F. dilatata*; 7. *Rhacomitrium lanuginosum*; 8. *Hypnum rusciforme*.

M. Skilton.—1. *Dicranum scoparium*; 2. *Hypnum cupressiforme*; 3. *Pottia truncatula*; 4. *Hypnum Swartzii*. Both the other specimens belong to *Climacium*.

W. J.—Your mosses are: 1. *Fissidens cryoides*; 2 and 4. *Weissia controversa*; 3. *Pottia intermedia*; 5. *Homalia trichomanoides*; 6. *Bryum cernuum*.

M. Warren.—The following are the names of your mosses:—1. *Hyp. cupressiforme*, var. *resupinatum*; 2 and 10. *H. rutabulum*; 3. *Ceratodon purpureus*; 4, 5, 6, 7. *Hyp. fluitans*; 8. *Hyp. aduncum*; 9. *Dosmatodon nervosus*.

Ellen Fisher.—Your specimens are:—1. (Reserved for future report); 2. *Bryum Zierii*; 3 and 5. *B. pseudotriquetrum*; 4. *B. cæspiticium*; 6. *Blindia acuta*; 7. *Grimmia patens*; 8. *Hypnum uncinatum*; 9. *Didymodon rubellus*; 10. *Lesquereuxia striata*.—R. B.

Mrs. J. F. W.—If snow cannot fall when the thermometer is below freezing point, how is it that we have nothing but snow falling above the snow-line and in the arctic and antartic regions?

EXCHANGES.

For *P. angulatum* with *S. Gemma*, well mounted as test slides, send good mounted objects to G. J. J., Broomfield Cottage, Altrincham.

Bulla hydatis, &c. for mounting Palates, for good Slides, also Palates and Jaws of *Gyrodus*, for good Trilobites.—R. T. Smith, 25, St. Alban's-street, Weymouth.

Polyxenes, Lagurus and tail hairs of do. mounted; also Trans. Sec. of Tamarisk, Male Fern, *Populus niger*, *Ulex europæus*, and section of Fern from Rob Roy's Cavern, a beautiful object polarized, all mounted; for good Slides.—G. Garrett, Harland House, Wherstead-road, Ipswich.

For Membrane of Bat, send a stamped directed envelope to W. H. Gomm, Somerton, Somerset.

Wanted, Skins in good condition, of *Insessores*, from South America, Europe, Africa, or the East, for North American Birds' Skins and Eggs, Minerals, Coleoptera (described, but unnamed), &c.—Address, W. J. Hoffman, M.D., Reading, Pennsylvania, U.S.A.

A German Immersion 1-25th (a capital Diatom Lens), and a little cash, for a good Immersion 1-12th or 1-16th; wet and dry fronts preferred.—J. S. Harrison, 48, Lowgate, Hull.

English Mechanic, vols. 19 and 20, and 21 numbers with index of vol. 21, unbound, for B Eyepiece, or 2 in. Acro. Objective for Microscope.—H. Ricket, 144, Coleman-street, Whitmoreans, Wolverhampton.

For Foraminifera from Mediterranean, send stamped envelope to M., 41, Thornhill-road, London, N.

Lepidoptera offered for good British Shells (Land and Fresh-water and Marine) and Birds' Eggs.—Address, Wm. S. Smith, Albert House, Castle-street, Walmer.

Wanted, first and third Reports of Quekett Club, also Mole Crickets, for good Micro. Slides.—H. E. Freeman, 48, Woodstock road, Finsbury-park, N.

Good Eocene Fossils (Isle of Wight), for others, from Crag or for Foreign Land Shells.—G. Sherriff Tye, 58, Villa-road, Handsworth, Birmingham.

A few Fossils, &c., for Pupæ, &c., or any volume of Science-Gossip, unbound, except 1874 and 1875.—H. Wiglesworth, Chilton Lodge, Rotherham.

Mounted Crystals of Carbonate of Lime from an Irish Ossiferous Cavern, and Crystals of Zeolite, from "Giant's Causeway," good Polariscopic Objects, for others of equal interest.—Wm. Gray, Mount Charles, Belfast.

For mounted Scales of Sole, Hairs of *Polyxenes lagurus*, or *Globigerina bulloides*, send good mounted Slide for each object required.—C. P. Ogilvie, Sizewell House, Leiston, Suffolk.

Eggs of Squacco Heron, Glossy Ibis, Little Ringed Plover, Hooded Crow, and Spoonbill, for American or other Foreign Birds' Eggs *only*.—J. W. Dealy, 142, Clarence-street, Sheffield, Yorkshire.

Wanted, Specimens (growing) of *Stratiotes aloides* and *Hydrocharis morsus-ranæ*; will give in return *Gymnogramma leptophylla*.—John Piquet, 12, York-street, Jersey.

A pair of Raven's Eggs, taken this season, and blown in the neatest possible manner; date and locality given. Desiderata: Rare specimens of Lepidoptera in similarly good condition. Unaccepted offers not answered.—Joseph Anderson, jun., Alresford, Hants.

A 9¼ in. "with Browning" silver on glass Reflecting Telescope on Altazimuth stand, with wheel and handles for easily moving it about gardens; one Kelner and four Achromatic Eyepieces, Barlow Lens, &c., all in excellent condition; also a good portable wooden house with zinc-covered roof, for a good Microscope.—T. H. Buffham, Clarendon-road, Walthamstow.

Fruit of *Xenodochus carbonarius*, and Spores of *Puccinia graminis*, for well-mounted Entomological Slides or sections of Wood, &c.—C. J. Jones, Gilmore Range, Shaco Heath, Stockport.

Wanted, Slides of Entozoa, Entomostraca, Desmids, Diatoms, Polyzoa, &c., for good Slides or Material, Injection Syringe, &c.; Material wanted also.—W. Tylar, 165, Well-street, Birmingham.

Palates of *Doris tuberculata* and *Cyclostoma elegans*, well mounted in glycerine, for good Palates of the less common British Mollusca, preferably in glycerine or unmounted.—Offers to Edward Horsnaill, 11, Snargate-street, Dover.

For Tufts of *Flustra foliacea*, send either stamped envelope or any object of interest to T. Comlidge, 5, Norfolk-street, Brighton.

For specimens of inside of Cactus Leaf (from Jamaica), for the polariscope, send stamped directed envelope to Charles Williams, Kingmead Villa, Woolcott-park, Redland, Bristol.

Duplicates: *Semele, Tritici, Multistrigaria, Valligera, Dentina, Conigera, Morpheus, Alsines, Testacea, L. Comma, Basilinea, H. marginata, Palleus, Impura, Strigilis*, &c., for other Lepidoptera or Birds' Eggs.—John E. Robson, Scaview-terrace, Hartlepool.

BOOKS, &c., RECEIVED.

"Physical Geography." By W. D. Cooley. London: Dulau & Co.

"Class-book of Chemistry." By E. L Youmans. London: H. S. King & Co.

"Myths and Songs from the South Pacific." By Rev. W. W. Gill. London: H. S. King & Co.

"Animals and Plants under Domestication." 2 vols., second edition. By Charles Darwin. London: John Murray.

"Monthly Microscopical Journal." March.

"American Naturalist." January and February.

"Journal of Applied Science." March.

"Land and Water." March.

"Ben Brierley's Journal." March.

"Transactions of Watford Nat. Hist. Society. Part 3.

"Fancier's Journal." January and February.

DECOLOURING AND STAINING VEGETABLE TISSUE FOR MICROSCOPICAL EXAMINATION.

By GEORGE D. BEATTY, M.D.

ON previous occasions I have contributed to this journal articles on decolouring and staining vegetable tissue. Experience gained during the past year enables me to give in this article processes that will produce improved results.

All vegetable sections, and some leaves, may be prepared for staining by soaking them in alcohol, or in a mixture of dilute nitric acid and chlorate of potash; but I much prefer the results obtained by first bleaching them in "Labarraque's Solution of Chlorinated Soda," and then treating them with alcohol for a few hours. In half an ounce of the soda solution a large number of sections may be placed, but not more than a dozen half or one-inch leaves, or parts of large leaves cut into inch pieces. Leaves in greater number adhere to each other, and thereby take longer to bleach.

Sections of matured wood should be kept in this solution from twelve to eighteen hours; sections of stems, leaves, and petals from six to eighteen hours; pistils and stamens, and sections through the gynæcium and receptacle of flowers, from two to six hours.

Leaves and petals should not only be bleached by the Labarraque, but should also be rendered translucent. This is accomplished in from six hours to six days.

If delicate leaves show evidence of disintegration after they are bleached, but before they have become translucent, they should be removed to alcohol, after washing them in water as described below. This renders them translucent within two days.

After removing from the Labarraque, put them into half a pint of clear water. Change the water five times during twenty-four hours, acidulating the third washing with five or ten drops of nitric acid. Sections can be washed in half the time required for leaves.

Next, put into alcohol, which in a few hours prepares them for staining.

In alcohol, tissue may be kept for months without turning yellow.

I.—Staining Leaves and Petals.

For staining leaves and petals the best dyes are aniline-blue and hæmatoxylin.

Other anilines than the blue may be used, but they are not so pleasant to the eye, and are harder to work, as they fade out in both alcohol and oil of cloves.

Red aniline may be used one quarter of a grain to an ounce of alcohol; violet, one half-grain; and green, three grains.

To make the blue aniline dye, dissolve in a mortar half a grain of "Nicholson's Soluble Blue Pure" in one ounce of 90—93 per cent. alcohol, which has been acidulated with half a drop of nitric acid; then filter.

Dilute a portion of this with alcohol to obtain a quarter-grain solution.

The formula for the hæmatoxylin dye is given further on.

A bright purple dye, good for leaves and sections, is made by steeping fresh berries of the *Phytolacca decandra* in alcohol. The stainings are quite permanent, but the dye does not keep over six weeks.

To Stain Leaves and Petals in Aniline blue.

1st. Transfer several small leaves from alcohol to about half a drachm of the quarter-grain blue.

If not stained of sufficient depth of hue in one hour—

2nd. Transfer to the half-grain blue for a quarter or half-hour.

3rd. Brush in 93 per cent. alcohol with camel-hair pencil, and trim the edges of cut leaves. Any excess of colour may be soaked out in this dilute alcohol.

4th. Put into half a drachm of absolute alcohol for half or one hour. In this but a trace of colour will be lost.

5th. Put in oil of cloves for one hour, or until ready to mount iu Canada balsam aud benzole.

To Stain Leaves and Petals in Hæmatoxylin.

1st. Trausfer from alcohol to water for five minutes.

2nd. To 3 per cent. alum-water for ten minutes.

3rd. To hæmatoxylin dye, diluted with an equal part of 3 per cent. alum-water, for one hour.

4th. To full strength dye, if necessary, for half or one hour.

5th. To alum-water for a moment, or until any excess of colour is soaked out.

6th. Brush thoroughly in water, and put into one ounce of cleau water for fifteeu minutes, to remove alum crystals.

7th. To 93 per cent. alcohol for fifteen minutes.

8th. To absolute alcohol for ten hours, or longer.

9th. To oil of cloves for one hour, or until ready to mount.

Some leaves, chiefly ferns with sori, may be double-stained with hæmatoxylin and aniline-blue; the former going to sori and spirals, the latter to other parts. The process is first to stain in hæmatoxylin, and then to soak the colour iu part from the body of the leaf by putting it in alum-water. Next carry through pure water and alcohol to a half-grain aniline-blue solution for thirty or forty-five *seconds*, and proceed as you do with a single blue staiuing.

II.—Double Staining of Sections.

For double stainings I use hæmatoxyliu and carmiue, and blue, green, and red auilines.

Of the red anilines I prefer that known under the name of Magenta or Roseine Pure, though Fuchsin, Ponceau, and Solferino may be used. These auilines are mauufactured at the Atlas Works of Brooke, Simpson, & Spiller, London.

The aniline dyes are made by dissolving the quantity given in each process, with aid of mortar and pestle, iu one ounce of 93 per cent. alcohol, and filtering.

The hæmatoxylin and carmine dyes are made according in the following formulæ.

Hæmatoxylin Dye.

Ground Campeachy wood......	½ ounce.
Pulv. alum	1 ,,

Mix and triturate in a mortar for twenty minutes, then add five ounces of hot distilled water, and let it stand for two days. Filter, and to each ounce of the dye add two drachms of 75 per cent. alcohol. In twenty-four hours again filter to remove precipitated alum. This dye is made somewhat after Dr. Arnold's formula; he using the extract instead of the wood. It keeps, with occasional filtering, in well-stoppered bottles for two months.

Borax Carmine Dye.

Pulv. Carmine..............	7½ grains.
Saturated Aqueous Solution of Borax	7½ fl. dr.
Mix and add Absolute Alcohol	15 drachms.

Filter and collect crystals when dry. Dissolve niue grains of crystals in one ounce of distilled water.

This is Mr. J. J. Woodward's formula; but not so strong, as his is a saturated solution.

Ammonia Carmine.

Pulv. Carmine..............	7½ grains.
Water of Ammonia	20 drops.
Absolute Alcohol............	½ ounce.
Glycerine	1 ,,
Distilled Water	1 ,,

Put the pulverized carmine in a test-tube, and add the ammonia. Boil slowly for a few seconds, and set aside, uncorked, for a day, to get rid of excess of ammouia. Add the mixed water and glycerine, and next the alcohol; theu filter.

Process I.—*To Stain Sections with Magenta and Blue Aniline.*

1st. Transfer from alcohol to magenta dye (one quarter of a graiu to the ounce), and let remain from fifteen to thirty minutes.

2nd. Soak iu alcohol for about the same time, or until the colour is entirely, or in great part, removed from parenchymal tissue.

3rd. Place or hold in a quarter, or a half-grain aniline-blue solution from fifteen to forty-five seconds.

4th. Shake in absolute alcohol for a few seconds.

5th. Put in oil of cloves for ten minutes.

6th. In clean oil of cloves for ten minutes.

7th. In half a drachm of benzole for five minutes.

8th. Mount in Canada balsam softened with benzole.

The benzole may be omitted, as it sometimes slightly contracts delicate tissue; but it causes the mounting to harden much more rapidly, aud, perhaps, is beneficial in preserving the magenta.

Process II.—*To Stain Sections in Magenta and Blue Compound.*

1st. Mix seven drops of a one-grain solution of magenta with five drops of a two-grain solution of blue (*non*-acid).

2nd. Iuto this purple mixture put your section for five or ten seconds.

3rd. Shake rapidly in absolute alcohol for a few seconds.

4th. Treat with oil of cloves and benzole as in process I.

Process III.—*To Stain Sections in Green Aniline and Carmine.*

1st. Put your section in a three-grain solution of iodine-green, and let it remain for one or two hours.

2nd. Soak in alcohol for five or ten minutes, for reasons given above.

3rd. Put in water for a minute.

4th. In the borax carmine from thirty to forty-five seconds.

5th. Shake rapidly in water, and soak out any excess of carmine that may be taken up.

6th. Put in alcohol for five minutes.

7th. In clean alcohol for ten minutes.

8th. In absolute alcohol for ten minutes.

9th. In oil of cloves for fifteen minutes.

10th. Mount.

Process IV.—*To Stain Sections in Green Aniline and Carmine Compound.*

1st. Mix fifteen drops of borax carmine with fifteen drops of the three-grain iodine-green solution.

2nd. Transfer section from alcohol to water for a minute.

3rd. Put in the dye from thirty to sixty seconds.

4th. Shake rapidly in water, and soak out any excess of carmine that may have been taken up.

5th. Treat with alcohol and oil of cloves as in process III.

Ammonia carmine may be used in the same proportion as the borax. Formerly, in process III., I used the carmine before the green, but I now follow Dr. B. W. Barton's plan of using the green first, as far better results are thereby obtained.

To stain sections in hæmatoxylin and aniline-blue, the mode of procedure is the same as for leaves; but they stain more rapidly, and only require the dilute dye.

Whether sections are stained by the alternate or by the compound methods, the selection of colours is the same. The red and green aniline and the hæmatoxylin go to spirals, bass cells, scattered thickened cells, and, sometimes, to thick epidermis and hairs.

The blue aniline and carmine always go to parenchymal and often to thin epidermic and hypodermic tissues. The selection of colour in matured wood is different, as will be seen further on.

It is not possible, I think, to give a satisfactory explanation of double staining of either animal or vegetable tissues. We can only say that certain dyes seem to have an affinity for certain cells. This is best shown by soaking single stainings in a fluid that removes their colour. If sections stained in red or in green aniline be soaked in alcohol, and those stained in hæmatoxylin in alum-water, the colour will rapidly leave the loose parenchyma, but will be retained for many days by the denser cells, as spirals, bass, &c.

On the other hand, specimens stained in blue aniline, if left in alcohol, and those stained in carmine, if left in water, lose the colour much more rapidly in the parenchymal than in other parts.

In my previous paper on double-staining of wood, &c., I said, if the blue was used before the red aniline, the selection of colour was reversed. This is true as regards matured wood, but does not hold good when stems and midribs are under treatment.

Matured wood is better stained by the alternate methods. In longitudinal cuts, the first colour used goes to longitudinal woody fibres, the second to spiral vessels, ducts, and bark. Sections of stems and leaves not infrequently give better results by the compound methods. These results are superior to those obtained in wood, for the reason, I think, that in the latter there are not the same extremes of hard and soft tissues.

Double stainings should be examined by artificial light. Compound dyes should be used immediately after they are made.

Care should be taken to obtain a good article of absolute alcohol. That manufactured by Dr. E. R. Squibb, of Brooklyn, U. S. A., gives me perfect satisfaction, while a German article I have used bleaches blue and green aniline stainings as though it contained some alkali.

Benzole instantly fixes those anilines that fade in alcohol and oil of cloves; but it does not do to transfer objects from alcohol to benzole except through the medium of oil of cloves, on account of the injurious contraction it causes.

It should be borne in mind, that chlorinated soda acts somewhat injuriously upon starch and protoplasm. This is not the case with dilute nitric acid and chlorate of potash, nor with alcohol.

In regard to fading, an experience of eighteen months enables me to speak quite favourably.

Some few leaves stained in blue aniline and in hæmatoxylin fade injuriously; others lose little or no colour. Sections double-stained in green and carmine have perfectly stood the test of twelve months. Those in magenta and blue as a rule hold well.

If the effects produced by staining properly-prepared vegetable tissues, with one or two colours, were more generally known and availed of, the study of vegetable histology would be even more attractive than at present. So striking and precise is the manner in which certain dyes seize upon certain tissues, that it must be seen in order to be fully appreciated.

A word about the cutting of sections, for much depends upon this preliminary step. They must be cut thin and even.

Vegetable parts cut into pieces should be kept in alcohol for a week or two before sectioning. If

leaves become crisp, which rarely occurs, a few minutes' residence in water renders them pliable.

In making sections of leaves, longitudinal cuts of midribs may be made, or vertico-transverse cuts through the midrib, including one-third of an inch of leaf on either side, or through several veins; leaves and small stems held against a piece of potato or turnip that has been hardened in alcohol, may be cut with a razor flat on the side, which is inferior when the back is held towards you. Alcohol should be poured over the object and razor while cutting. Large stems are better cut in a section-machine, using paraffine as an imbedding agent. The object should be flooded with alcohol while cutting, and the paraffine should be trimmed to a cone-shape around it after every two or three cuts.

A knife I use with my section-cutter acts so satisfactorily upon both animal and vegetable tissues that I will describe it. It weighs 7½ ounces (avoirdupois). The handle is stout, and is 4½ inches long by 1¼ inches wide, the blade is 7½ inches long, the back being ¼ inch thick. The inferior side, holding the back towards you, was first ground flat and afterwards slightly concave from back to edge. A similar knife I find is figured in Mr. Rutherford's "Outlines of Practical Histology."

A list of some of the vegetable objects I have found most interesting may be acceptable to some of the readers of Science-Gossip.

Leaves.—Drósera rotundifolia, Dionea muscípula, Hepática triloba, Oxalis stricta, flava, hirsuta, and Bowiei; Deutzia gracilis, cruenta, and Fortunii; Tradescantia zebrìna, Eucalyptus globulus, Buchu serratifolia, Cassia acutifolia, Rhus Toxicodendron, Adiantum cuneatum and pedatum, Pteris serrulata, Elae agnus.

Sections of Stems and Midribs.—Ficùs elastica, Strelítzia Regìna, Althæa rosea, Asclepias cornuta, Rùbus villòsus, Impatiens Balsaminia, Pteris aquilina and serrulata, Paulownia imperialis.

Sections of Stems.—Aspidium Filix mas, Ricinus communis, Mùsa sapientium, Euphorbia splendens, Datura stramonium, Dracæna Braziliensis, Ailanthus.

Baltimore, U.S.A.

THE "SEAR LAMP."

I HAVE been giving my attention of late to the subject of illumination for the microscope, and having used all the various forms, from the date of Mr. Pilsisetur's lamp of 1850 down to the present time, I came to the conclusion that there was yet something needed to render microscopical illumination as perfect as the use of petroline or paraffin will allow.

Having mentioned the subject in the course of a conversation with Mr. Silber, the inventor of the now well-known "Silber Light," that gentleman at once entered into the matter, and has constructed for me a microscope lamp in the form which I have illustrated in the following sketch, and which I will at once proceed to describe.

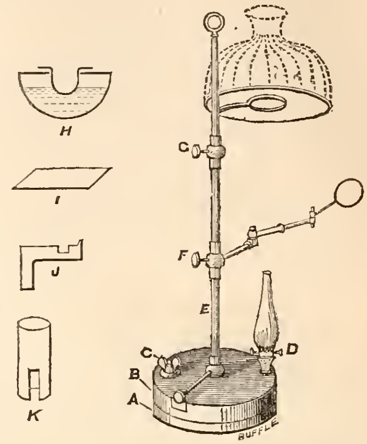

Fig. 48. Sketch and general details of the "Sear Lamp" for the Microscope.

A is a solid brass foot, only half an inch in thickness, circular, and 7 inches in diameter. B, the oil-holder, which holds about sixteen hours' supply, and is of the same form as A, the stand; but as its total depth is only about 1 inch, the burner, D, can by this form of lamp be brought down several inches closer to the table, or rather closer to the plano-concave reflector of a microscope, than by any other form of lamp of equal power; and as light increases as the square of the distance, the increase of illuminative power obtained by this mechanical arrangement is important. C is a tubulated aperture forming a small funnel for the purpose of replenishing the lamp, secured by a butterfly nut, and thus obviating the disagreeable necessity for extinguishing the lamp and screwing off the burner, in order to supply fresh oil. D, the Silber burner. E, a strong cylindrical brass stem, upon which both the lamp-body, B, and the accessories, F and G, slide; the latter being clamped at any convenient height by their binding screws, and the oil-holder, B, by the long radial screw shown in the sketch, and which for greater facility of manipulation has been extended to the periphery of the cylindrical oil-vessel. F is a large plano-convex condenser, which, being mounted on a jointed telescopic arm, can be placed at any angle, and close to or more distant from the flame. As I write, a friend of mine is reading his "Gossip" at 18 feet distance from the lamp, the condenser being interposed close to the flame; but this is only mentioned to show its power, and not its superiority as a reading-lamp. G, a slide bearing two rings; the lesser is 2¾ in.

diameter, and adapted to carry a porcelain or copper hot-water bath, or a small brass plate. The former is illustrated in section at H, and the latter at I, and their use to the microscopist in the practice of preparing and mounting objects is not easily overrated. The larger ring carries the ordinary reading-shade, and both are concentric with the burner D. Three carriers of the form J are attached radially to the burner D, and upon them the porcelain white cloud-shade K rests, while a blue spot upon the lamp-glass of D corrects the yellow rays (less in number in the Silber burner at any time than in ordinary petroline flames), and renders this, to my mind, the most powerful and most complete microscope lamp known.

I shall have the pleasure to introduce the first one manufactured to the notice of the members of the Royal Microscopical Society at their next meeting, and immediately afterwards they will be supplied by the Silber Light Company (Limited) and their agents; but I should perhaps at once say that I have no interest whatever in their manufacture, beyond a desire that the "Sear Lamp" may prove a useful and convenient accessory to the use of my favourite instrument, the microscope.

W. LANE SEAR,
Hon. Lib. Margate Micro. Club.

A CHAPTER IN THE HISTORY OF ROCK STRUCTURE.

By the Rev. J. Magens Mello, M.A., F.G.S., &c.
President of the Derbyshire Microscopical Society.

THE study of rock structure is one of great interest to the geologist, and not only does it teach him the various materials of which any particular rock is built up, but it will often lead him to the knowledge of wonderful facts relating to its origin and past history, and will enable him to trace some of the many changes to which it may have been subjected during the lapse of time.

I propose to illustrate this by taking some familiar specimen and showing the ways in which we may investigate its nature and history.

Suppose we take a piece of granite and see what we may learn about it. There are few persons but are acquainted with this rock in some one or more of the forms in which it is found. Our public buildings often present us with splendid illustrations of granite, sometimes roughly hewn, as it has come from the quarry; in other cases highly polished. We have seen the fine grey stones from Aberdeen, or the beautiful red ones from Peterhead and elsewhere. Now when we begin to examine a piece of one of these granites, we see at once that it is not a homogeneous stone—such, for instance, as is a bit of flint—but that it is built up of various dissimilar-looking materials; and we may notice, moreover, that one or more of those materials is crystalline, that it is shaped in some regular geometrical form. We shall probably be struck with certain whitish or flesh-coloured crystals, more conspicuously promi-

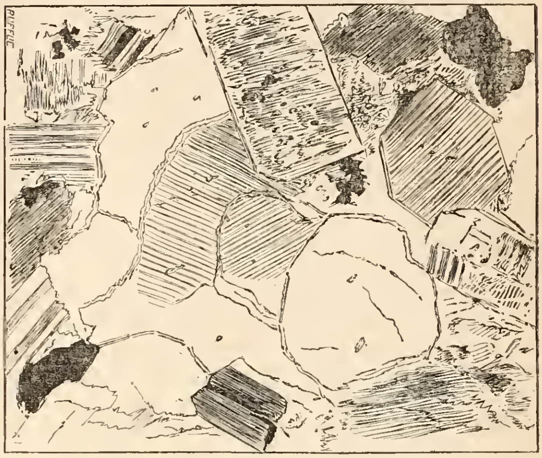

Fig. 49. Section of granite from Cornwall (polarized), magnified 26 diam.

nent than the other substances of which the specimen is composed. With some care we may be able to make out in part the form of these crystals, and perhaps to measure one or more of their angles;

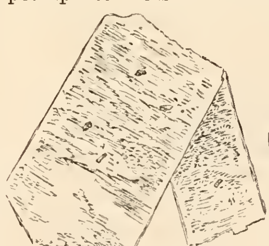

Fig. 50. Orthoclase Felspar.

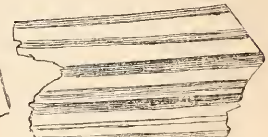

Fig. 51. Plagioclase Felspar.

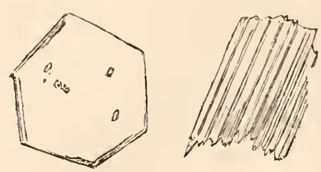

Fig. 52. Mica (Biotite).

then, too, we shall notice that these crystals are apparently embedded in a more glassy-looking substance of a clear or greyish colour, and here and there we shall observe some bright spangles of a thin flaky mineral. We shall thus have seen the three principal minerals of which typical granite

rock is composed; the larger opaque crystals, whether white or pink, are felspar, the glassy mineral is quartz, and the little glittering spangles are mica. We may next proceed to a more detailed examination of each of these in turn. We will first ask the chemist what he can tell us of their composition. The chemist is not satisfied with merely knowing that a certain mineral occurring in certain definite crystalline or other forms is quartz, another felspar, and so on; but he asks further,—What is this quartz? Is it a simple body or is it, simple as it may appear to sight, a compound of two or more elements? He takes various specimens of quartz, some perhaps from the granite, others from some other rocks, and subjects them to the analytical processes of the laboratory: the result is that he finds all quartz, no matter what its colour may be, whether white or pink or black, or pure and colourless as glass, to be a compound of the metalloid silicon and the gas oxygen; in other words, that it is an oxide of silicon, to which he assigns the name silica. By a series of analyses he is able to correlate the quartz of the granite with all other forms, and they are many in which this mineral occurs. The flint of the chalk, the white veins so often met with in the older slaty rocks, the agates picked up on the sea-shore and elsewhere, the beautiful crystals known as cairngorms, amethysts, and others, are all found to be but varying forms of the same substance, coloured sometimes by adventitious matter, as iron, &c.; and he finds, too, that the exquisite skeletons of some of the sponges, the delicate valves of the diatomaceæ and other minute specimens of organic life, consist of this very same silica, which is indeed one of the most important compounds entering into the structure of the earth's crust. Suppose the student next picks out one of the felspar crystals: this on analysis will be, as was the quartz, found to be also a combination; in it he will also find silica, but the silica in this instance is found to be combined with the metals aluminium and potassium,—in fact, is a double silicate of alumina and potash. There are many varieties of felspar, some of them differing from that most common in granite, which is called orthoclase, in containing lime or soda instead of potash; these are also distinguished from the orthoclastic species by their crystalline structure, which will afford, as we shall see, a ready method for their recognition when they are microscopically examined. When the granite rocks become decomposed, as they often do in Cornwall and elsewhere, through the wear and tear of the weather, we frequently find the disintegrated materials so separated that the silicate of alumina of the felspar forms thick deposits of the beautiful white clay known as Kaolin, and which is so valuable to the china-manufacturer.

The mica of granite is usually a variety called Muscovite, or potash mica; this again on chemical analysis is found to contain, as did the felspar, silica, alumina, and potash, and also often some iron and manganese. There are several different sorts of mica, also, sometimes found in granite, especially Biotite, the composition of which varies from the above; but all the micas may be known by their being found in flattish crystals, which may be split up into an infinity of thin leaflets. Thus far our unaided eyesight and the help of the chemist have shown us what granite is made of; but we are now beginning to learn that, would we know something of the real history of a rock, a far minuter examination is needful, and geologists are rapidly learning that they must turn to the microscope if they would receive answers to many important questions, both as to the history and also as to the composition of rocks. A marvellous light has been shed during the past few years on rock-structure through this minute investigation, especially with the aid of polarized light. The intricacies of the closest-grained rocks have been disentangled, their component parts distinguished from each other, and the very order and history of their combination in the mass revealed. Now, when we examine our granite beneath the microscope, which can be done by having thin slices prepared, we shall learn something about it which we could hardly hope to have discovered without this aid. There has been much speculation as to the origin of granite, whether it is a plutonic—that is, an old volcanic rock—or whether it is only a deposit from water consolidated and altered during the lapse of long ages by heat and pressure: the microscope will help us to the truth. When magnified and examined with the polariscope, a thin section of granite is a very beautiful object, and its different constituent parts stand revealed with the greatest distinctness: we at once learn to see the crystals of felspar, somewhat opaque and cloudy as they usually are in granite, but now and then clear and beautifully striped, and also the crystals of mica, embedded in the clear quartz, which will be at once known by its bright clear colours and by the margin of rainbow-like tints which border its patches. Ordinary orthoclase felspar is usually somewhat opaque and dirty-looking under the microscope and by this it may be distinguished from the clear glassy sanidine which is frequently found in igneous rocks, and presents under the microscope, when polarized, pure rich colours as well as sharply-defined crystals similar in form to those of the common orthoclase. The orthoclastic felspars may be very readily distinguished from the plagioclastic by their structure, as revealed by the polariscope; the latter invariably are seen to be striped with variously coloured bands, showing what is called twin crystallization; and the orthoclase, though often forming twins on a larger scale, does not present the minutely banded appearance of the plagioclastic felspars. The mica in the granite section will not

be difficult to recognize, especially if Biotite; often we shall observe it as forming fairly-shaped hexagonal crystals, and the polariscope will also help us to know it by its thinly laminated structure, giving rise to fine parallel striæ on the surface of its crystals. Its colours, also, when polarized will be duller than those of the quartz, for which it might sometimes be mistaken at first sight, should it be a light-coloured mica; and then, again, it will frequently be found that when the prisms of the polariscope are crossed the mica becomes perfectly opaque, its sections having been formed across the optical axis. But let us now look at the quartz. We shall observe that this quartz is generally not crystallized in definite forms, as are the felspar and the mica; it appears as a matrix which has been at some time or other soft and so is penetrated by the other crystals, the interspaces of which it fills up: this shows us at once that it must have been solidified after them, and so was unable to assume its regular forms. This is a very remarkable fact, and helps us towards the secret of the formation of the granite. We know that quartz requires a higher temperature to melt it than does either the felspar or the mica, and so, had the granite been formed as are regular volcanic rocks in the ordinary way of igneous fusion, we should certainly have found that the quartz would have crystallized before either the felspar or the mica, and it would have been seen in definite crystalline form, and its crystals would have interfered with and penetrated those of the other mineral constituents of the rock. Again, if we look carefully at the quartz with a moderately high power, we shall see in it certain small cavities, and some of these will be seen to contain a certain amount of liquid, and also an air-bubble, which will move as the specimen is moved. This liquid has been proved to be water, and from the fact of its not entirely filling the cavity we learn that a reduction of temperature has taken place since the water was first caught up by the quartz, causing the contents of the cavities to contract. Sometimes we shall find other cavities, which, instead of containing water, contain small crystals, or even air only. Now, from all these facts it appears tolerably certain that the granite was formed under peculiar circumstances; it has never been such a purely molten rock as is the lava of a volcano, which is poured out from its crater to the light of day. We gather that it was rather formed at great depths in the earth, where it may have been partially melted, partially subjected to the action both of water and of steam, charged with various mineral substances, and subjected to enormous pressure. What the original condition of granite was we cannot tell: some have gone so far as to think that it may have been that of a sedimentary rock, which has been metamorphosed by the forces just alluded to. But whatever the primary state of granite may have been, its present condition shows it to belong undoubtedly to the igneous class of rocks, but to have been formed under conditions differing from those which have given rise to lavas reaching the surface. As far as can be gathered, the granite rocks, as such, have never seen the light of day until exposed by denudation, &c.; their origin was deep in the central portions of ancient volcanoes, where, by partial melting and slow cooling, under intense pressure, and in the presence of some water, the various minerals came together and crystallized into granite.

NOTES ON THE DIPTERA.—IV.

Muscidæ (*continued*).

SINCE our space is necessarily limited, we are compelled to pass by many flies which otherwise we should like to describe. As the Helomyzides are a large sub-family, we will take another example from them—namely, Tetanocera. Flies of this and two or three other allied genera are remarkable for their oddity. There are ten or eleven species of Tetanocera tolerably common, so that it is difficult to know which to choose for description. At fig. 55 is drawn the head of *Tetanocera marginata*, which, although not so common as one or two other species, is perhaps the oddest fly of the whole genus. It is the form of the head and of the antennæ particularly which gives these flies their peculiarity,—indeed, a Tetanocera may always be recognized by its antennæ, which are carried horizontally, and always have the third joint more or less pointed. In *T. marginata* the second joint is much longer than the third. This is the characteristic feature of the fly. Its general colour is rusty, and its wings are speckled brown and white. Another species which we frequently meet with is *T. cucullaria*. This, too, as are all the common species of Tetanoceræ, is a rust-coloured fly. It is not unlike a dung-fly in shape, but the head, instead of being round, is somewhat flattened, and the face is white. It may be distinguished from other Tetanoceræ as follows:—The bristle of the antennæ is covered with short downy hairs, while its second and third joints, unlike the antennæ of *T. marginata*, *are of equal length*. The wings are transparent, with a number of indistinct pale brown dots towards the tip. But perhaps the commonest Tetanocera is *T. Hieracii*, which can generally be procured from marshy places. Its characteristic features are these: the bristle of the antenna is fringed with hairs, while the third joint is slightly longer than the second. Its wings are dark brown, covered with three transverse bands of transverse spots, and the discal transverse vein undulates slightly, but not so much as in fig. 30.

The mouths of the Muscidæ are all formed on one type, which, however it may be varied, can be

recognized at a glance. As flies of the genus Tetanocera have mouths of the normal shape, we have selected them for illustration and description.

Fig. 53 is a drawing of the mouth of *Tetanocera Hieracii* magnified 45 diameters, and viewed as a transparent object to show its muscular action, which, as it is difficult to understand, we describe somewhat at length. Since everybody is not versed in anatomical terms, we would premise that a muscle is fixed to the skeleton (or to those portions of the animal which serve as the skeleton) by two points only, at one of which it is said to "arise," while at the other it is "inserted"; and further, a muscle pulls its point of "insertion" or "attachment" towards the point where it has its origin, *i.e.* "arises." The mouth of a fly has three joints, and the part which first attracts our attention is the pharynx, which forms the basal joint (*ph*, fig. 53, and shown in section at fig. 54). A good idea of its shape may be obtained by cutting an isosceles triangle out of a piece of paper, folding it down the middle, and fastening together the two corners which possess the equal angles. Our model pharynx, however, will not possess the two posterior "processes," nor the long and narrow chitonous plate which moves up and down between its sides. To the processes are attached a pair of muscles, *b*, which arise from the rim of the oral cleft at the point *d*; at *d''*, on the opposite side of the rim, arises a muscle *c*, which is inserted at the base of the mentum. These are respectively the exsertor and retractor muscles of the mouth. The figure shows the pair *b* contracted; consequently the mouth is pushed out from the head. If the muscle *c* were similarly contracted, the pair *b* would relax, and the mouth be withdrawn. At *a* are the pharyngeal muscles. They arise from the top of the pharynx, and are inserted into the plate *r*, fig. 54. (Shown in fig. 53, but not lettered.) It forms the roof of the mouth, and it is joined to the sides of the pharynx. It has a certain limited up-and-down motion, and it is shown nearly shut in fig. 53, and wide open in fig. 54, as if for the passage of food. The raising and lowering of this plate *r* produces suction, and it is moved, of course, by the muscles marked *a* in both figures.

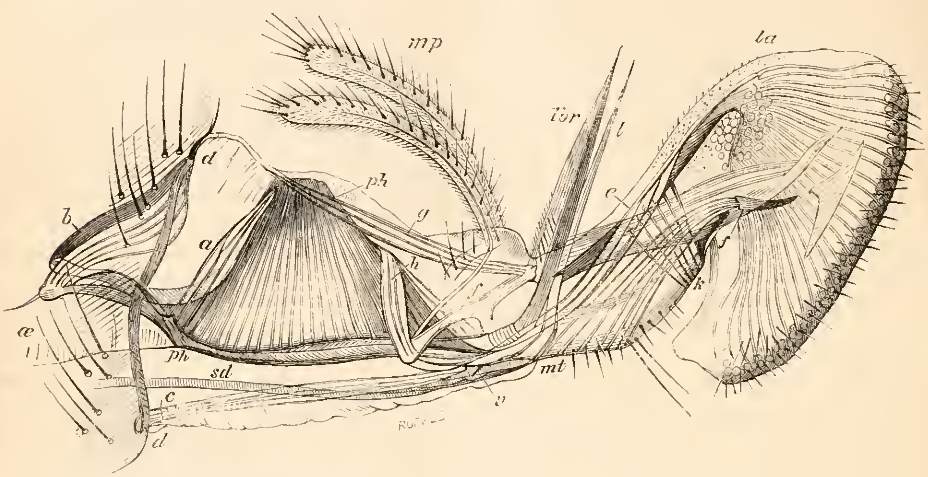

Fig. 53. Mouth of *Tetanocera*, ×45 diams., as a transparent object: *ph*, *ph*, Pharynx; *lbr*, Labrum or upper lip; *f*, one of a pair of fulcra which move it; *l*, Lingua or tongue; *la*, Labium or lower lip; *mt*, Mentum; *f''*, Processes which terminate it; *d*, *d''*, edge or rim of the oral cleft; *œ*, Œsophagus; *sd*, Salivary duct; *v*, Valve in the same. Names of the muscles, and their points of origin and insertion:—*b*, Exsertors of the mouth, arising from the rim of the oral cleft at *d*, and attached to the processes of the pharynx; *e*, Retractor of the mouth, from *d''* to *mt*; *a*, Pharyngeal muscles, from top of pharynx to the roof of the mouth; *e*, Depressor of the labium, from tip of pharynx to *e*; *g*, Elevator of the labrum, from apex of the pharynx to end of the fulcrum *f*; *mt*, Muscle of the mentum, from its base to its tip *f''*; *k*, Transverse muscle of the mentum, from *e* to *k*.

At *lbr* is the upper lip or labrum, which when at rest fits tight over the labium. It consists of an inner and an outer plate connected by transverse muscles (see figure). The inner plate is continuous with the plate *r*, as the roof of the mouth. At *f* is shown one of the fulcra which move the labrum. There are a pair of them, one on each side, and they are articulated to the base of the outer plate. They are the homologues of the maxillæ in Syrphidæ and other flies. At the top of the pharynx arises a pair of long muscles, *g*, inserted where the fulcra join the labrum. These muscles elevate that organ, as shown in the drawing: attached to the other end of the fulcra are the muscles *h*, which depress it; while another muscle (only faintly drawn), which has its origin at the tip of the pharynx, aids *g* in raising it. These three pairs of

muscles seem to serve also for raising and lowering the rest of the mouth, for there are no others to do it.

In the thorax are two salivary glands that terminate in a pair of ducts. The pair join, and form the salivary duct shown at *sd*, fig. 53. This has a valve at *v* to control the emission of saliva, and it terminates in the lingua or tongue, *l*. In biting-flies it

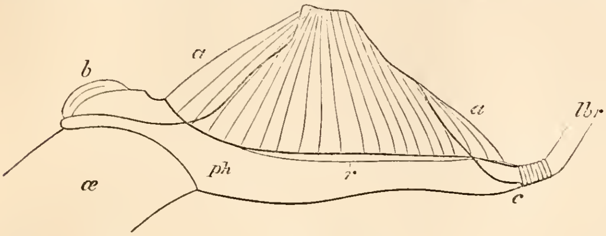

Fig. 54. Mouth of *Tetanocera*; diagram illustrating the action of the pharynx, ×45 diam.; *ph*, Pharynx; *c*, Its tip, where numerous muscles are attached; *lbr*, Commencement of labrum: *a*, Great pharyngeal muscle; *b*, small muscle; *œ*, Œsophagus; *r*, Roof of the mouth, which moves up and down.

Fig. 55. Head of *Tetanoceras marginata*, ×14 diam.

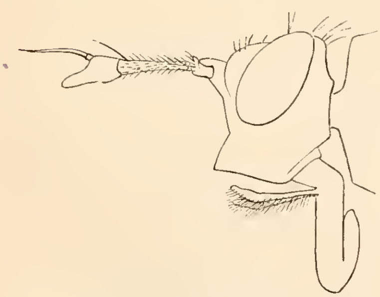

Fig. 56. Head of *Sepedon sphegeus*, ×14 diam.

is the injection of saliva into the wound made by the labrum that produces irritation and swelling.

The whole of the second and third joints of the mouth are called the labium. This is of three parts —an outer plate (*mt*, fig. 53), which is the mentum; an inner plate, *e*, which forms the floor of the mouth, and is the labium proper; and, thirdly, a pair of lobes.

The mentum terminates in a pair of long processes (*f″*, fig. 53), which are attached to the outer skin of the lobes by means of a triangular thickening of the membrane (see figure). Joined to these processes is a pair of longitudinal muscles arising from the base of the mentum. The contraction of these would naturally draw the processes together, and so shut the lobes of the labium, while the contraction of the transverse muscles *k* would perhaps tend to separate them.

To the under side of the floor of the mouth, at *e*,

Fig. 57. Head of *Loxocera ichneumonea*, 12 diam.

is attached a muscle arising from the tip of the pharynx, which bends down the labium when the fly wishes to bring its lancets into action.

The inner surfaces of the lobes are traversed by about thirty minute gutters, generally known as "false tracheæ," but which, since that name would lead one to suppose that they are closed tubes instead of open gutters, we prefer to call "capillary channels." The food of the fly, which is almost entirely liquid, is collected by these, and passes between the labrum and labium into the pharynx, which, as before noted, supplies the power of suction.

The whole mouth is liberally supplied with tracheæ, which ramify so much that even each of the hairs on the exterior surfaces of the lobes has a separate branch.

We hope that this figure and description will enable amateur entomologists to understand how a fly eats, which is somewhat difficult to make out from specimens prepared in the ordinary way.

Fig. 56 is an outline of the head of *Sepedon sphegeus*, a fly belonging to the same sub-family as Tetanocera, and in many respects resembling that genus. It is not common enough to be described here, but the drawing is given to show how widely the antennæ differ from the ordinary type prevailing among the Muscidæ, and approach the type found in the Conopidæ.

Passing over several sub-families, we come to the Psilides (*i.e.* "smooth flies"), to which belong two insects better known than liked; viz. the Cheese-fly (*Piophila casei*), and the Bacon-fly (*P. luteata*). These are the parents of the "hoppers" which infest cheese and bacon.

Belonging to this sub-family there is a fly of very paradoxical appearance, named *Loxocera ichneumonea*. The name Loxocera (meaning "oblique horn") is given to the genus because the antennæ,

which are of great length, are carried, not horizontally, but at an angle of about 45° with the line of the body, as shown in fig. 57. This species is called Ichneumonea because of the very considerable resemblance it bears to some of the ichneumon-flies; in fact, it is so unlike the Muscidæ as to be certain to puzzle any one meeting with it for the first time; and, as it is pretty frequently found, a description may be acceptable. In length (not including antennæ) the male is about $\frac{3}{10}$, the female about $\frac{4}{10}$ of an inch: the body is slender, quite smooth, and polished: the legs, the hinder and lower part of the thorax, and the mouth, are bright red; the remainder of the body is black. The wings are colourless, with black veins; the legs small; and the antennæ longer than the head. The abdomen of the female is much longer than that of the male, being produced to form a long and pointed ovipositor. This genus, like Tetanocera and Sepedon, may be at once recognized by the antennæ.

This sub-family contains many grotesque flies, of which not the least remarkable are those of the genus *Micropeza*, which, for length and slenderness of legs may be compared with the Nemocera or long-horned Diptera.

Some of the ovipositors of the Muscidæ are well worth examining, especially the knife-like ones found in the sub-family Ortalides, which can be retracted into the abdomen like a telescope: these require to be drawn out with forceps before they can be fully seen with the microscope.

This paper gives nothing beyond a mere glance at the Muscidæ, and the insects described are only specimens chosen from an almost bewildering number of forms interesting both generally and microscopically. Any one requiring further information will find the subject minutely treated in the best English work on the Diptera, "Insecta Britannica, part Diptera," by Francis Walker (in English and Latin). Schiner's "Fauna Austriaca, part Diptera" (in German), describes a very large number of species, and contains much useful information. Among other noted works are those of Westwood, Curtis, Macquart, and Meigen. These are expensive books, but they may be found at some of our national libraries.

FRANK J. ALLEN & H. M. J. UNDERHILL.

THE WRYNECK.

(*Yunx torquilla.*)

THE peculiarity of structure, the shy and interesting habits, combined with the sombre, yet beautifully-pencilled plumage of the Wryneck (*Yunx torquilla*), are characteristics well calculated to excite inquiry, and the curiosity of all those who are at all partial to the study of the feathered tribes. This bird is one of our numerous summer migrants, visiting here at the end of April or beginning of May. It seems to restrict itself more especially to the south and south-east of the country, specimens not having been often seen in the north and more elevated districts. Its partiality to that part of the country which it inhabits may be attributed, in some degree, to the warm and dry climate, where all the minuter and more destructive insects abound; such as ants, aphides, &c.; the former being the chief objects of subsistence to which the Wryneck has recourse, it is quite consistent that the bird should have such a predilection for those localities which it inhabits. In its natural haunts it can easily be distinguished at first sight from all other birds, by a habit peculiar to itself, which seems to be occasioned by a convulsion of surprise, as when engaged over an abundant supply of its favourite food. The body is kept quite still, the neck twists and turns backwards and forwards, while the head is continually swaying from side to side, which gives it more the appearance of a reptile than a bird. It is from this peculiarity that it has earned the appellation which it bears; in fact, almost all its other names in various languages refer to the distortion of the neck: our worthy cousins beyond the Channel designate it by the name of *Torcol*, in Germany *Natter-halz*, and in Italy *Torto-collo*.

Though the Wryneck cannot boast of the brilliancy of its plumage, it is so neatly and beautifully mottled with different mural hues, which set off and blend into each other so well, as to make it appear very handsome, even more so than a bird of more gaudy tints. Above, the ground-colour is a yellowish brown, beautifully variegated with spots of brown and hues of black, somewhat resembling arrow-heads in appearance, and a very distinct mural hue of brown from the nape of the neck down the back. The ground-colour beneath is whitish grey, tinged with a slight rusty tint towards the neck, with arrow-head hues of black, here forming bars; the tail consists of ten flexible feathers, which are mottled, and have black edges, as well as two or three waved bars that run across it; the quills are brown, also bound with black. It is about seven inches long, and ten across the wings; the bill, which is nine or ten lines in length, is slender and pointed. The vocal powers of this bird are very limited, being only a very shrill drawling whistle.

It belongs to the interesting order *Zygodactyles*, or "yoke-toed," two of the toes being turned forward and two back; the former are joined at their bases, and the exterior toe in each foot is much longer than the interior. The great forests of the tropics are the chief nurseries for this order; there they are characterized by their gorgeous colours, great multitudes, and harsh voices; chief amongst which are the Parrots, Macaws, and Toucans. In this country, we have the Woodpecker, the Wryneck, and the Cuckoo (*Cuculus canorus*). Although

there are a great many curious varieties and modifications in the structure of the foot, yet the same principle is held throughout. It can clearly be comprehended that the foot has two bearings, as it were, in front and behind, so that the bird can walk up a perpendicular pole, or lengthwise on a thin branch, the nails being very sharp in the Wryneck; it can even cling to a wall if there is the smallest crevice to get a hold with. There is abundance of food for birds that can be attained only by walking or perching in this manner. Insects are there lurking beneath the bark and in the crevices of trees, which would do serious damage if there were no birds to keep them down; hence we see how essential it is that they should have this peculiarity of structure, and it is a good example how apparently little difference from that which answers one purpose, may answer a very different one. The legs are placed behind the centre of gravity, so that the bird sits very upright on the branch to which it clings, or its body is thrown backwards, so that the weight of the bird assists in compressing the claws into the fissures of the bark, and presses the tail under them; thus using it as a prop, without that exertion of the body which would prevent the free use of the beak. This last organ, in the case of the Wryneck, is not thick and strong, as it is in the Woodpecker, in which case it is used for tearing up the bark in search of insects; but, as was said before, weak and pointed, and does not assist it in finding its nourishment, but is the sheath of a large tongue, which it can protrude for quite an inch, darting it into the crevices of bark and ant-hills, and retracting it with the rapidity of lightning covered with struggling ants, which stick to its viscous humidity. The point of the tongue is horny, and it is in conjunction with the bill that it is used for disturbing their dwellings, which readily brings them out to ascertain the cause of destruction, or to reconnoitre their persecutor, when they are very soon picked off. The structure for the extension of the tongue is very similar to that of the Woodpecker: two powerful muscles rise from the root, and after stretching from the crown of the head and enclosing the larynx, are inserted in the front.

The nest-building propensities of the Wryneck are anything but extensive. At the time of incubation a hole in an old tree is chosen, and perhaps it may be enlarged or altered in any way to adapt it to circumstances; yet it is quite a mistake, as some suppose, that the bird wholly excavates the recess for itself: this would be a thorough impossibility, on account of the extreme frailty of the bill. The bottom of the hole is lined with the *débris* caused by enlarging the sides; then the eggs are deposited without any further preparation, which are about ten in number, snow-white, and large as a sparrow's in size.

It is a curious fact, that a bird which lays such a number of eggs, should be so local and scantily spread. It is true that it appears throughout all Europe, from the southern states to Sweden, and is even said to be in Bengal and some other parts of India; but this should be a cause of increasing, rather than diminishing their numbers. Perhaps the nest generally being in a situation so easy to gain access to (averaging from five to eight feet from the ground), may often be pillaged by those predaceous creatures, which so highly relish the dainty morsels which it contains; or, again, as an intelligent ornithologist states, "The ants which the Wryneck finds in those localities which it frequents, are exceedingly numerous when the weather is favourable, but are rather uncertain, from their extreme sensibility, and the great degree which the maturing of their eggs depends on the state of the atmosphere. Hence, we can easily see that the fate of a bird which is in a great measure, if not entirely, dependent on a summer production, and that production very much under the influence of the weather, must often be reduced to extremities, and is probably as liable to suffer from contingencies in its winter retreats, wherever they may be."

In conclusion, I may state that this bird has never been known to live more than a few weeks in confinement. In the first place, the proper food is very difficult to be obtained; and, secondly, when it is offered, the bird rejects it. A French gentleman once procured a mother, together with the nest and young: they were fed on paste made of bread and cheese, and lived nearly three weeks, by which time they became quite tame, and would even eat out of his hand. But when they grew larger, they seemed to fall into a languid state, and refused the usual paste, and as ants could not be procured for them, they died one after the other of hunger.

Woolwich. C. P. Hall.

ON THE GROWTH OF THE WILLOW (*Salix alba*),

WITH NOTICES OF SOME CURIOUS TREES OF THAT SPECIES.

By Edwin Lees, F.L.S.

It was a saying of the celebrated eremitish contemplator and lover of solitude, as well as promoter of monastic life, St. Bernard, that he had learned more from trees than men; and no doubt the naturalist with any poetical feeling in his temperament might well echo such a sentiment. But the physiological botanist, who looks about him in the woods and on the banks of streams, may also pick up some knowledge from studying the growth of trees; and even the common Willow (*Salix alba*) can show some very curious instances in its mode of growth and resuscitation. As a tree, its allotted life

is but short in comparison with other deciduous trees, as it soon becomes hollow, and is easily upset by winds. But, as I am about to show, it has power of resuscitation which enable it to prolong or renew existence.

The propagation of the Willow is easy enough, as a mere branch, or stick, if planted, will grow; but after becoming hollow, and appearing to be an easy prey to the tooth of time or any wind that may blow, it is enabled by a remarkable process to send down roots from above, which anchoring in the soil, give the Willow a fresh hold upon life, and its protracted existence is thus secured.

Fig. 58. Peculiar growth of the head of *Salix alba*.

A silvery feature is given to a landscape where the waving willows by the brook-side predominate, and are agitated by the wind. Even when denuded of their leaves, the "willowy brook" may still be traced, and the old pollards ranged along the bank, like giants with huge distorted heads, and bent towards the earth by the force of continued gales, make a characteristic feature not to be mistaken. I have noticed numerous old willows on the banks of the river Teme in Worcestershire, which perhaps more than any other English river is bordered with willows in every stage of age and decay, often forming very grotesque objects. As they are all pollarded by the farmers on whose land they grow, many of them form enormous heads on which in ime a *humus* is deposited, and mosses accumulate; thus affording a nidus for seeds and berries to rest upon and vegetate. In this manner epiphytes arise, and it is curious to observe seedling oaks, hawthorns, alders, and hazels, and sometimes sycamores and ashes, besides smaller shrubs, growing upon and mixing their foliage with the old pollard willows. An old willow with its family of colonists, among which are often many flowering plants upon its wide-distorted head, thus makes a very curious spectacle.

As the Willow grows rapidly to maturity, its duration is proportionally short, and, shattered by winds and storms, it bends in a decrepit state over the streams on whose banks it grows—"stooping, as if to drink," Cowper says,—and becoming hollow with a still sprouting head, is easily overthrown. Fallen willows often form rustic bridges, useful to the wanderer in crossing streams where there is no foot-path to aid his progress.

Fig. 59. Aged hollow willow near Pawick.

Nature gives some compensation to the Willow for its short natural life by giving it means of resuscitation in several ways, and it clings to life with remarkable energy. Even if the trunk be broken and the head blown off, if the latter only retains the slightest hold upon the tree, and in its fall is supported by a neighbour, the head produces an abundant crop of branches, continuing to flourish notwithstanding its prostration. I have sketched a remarkable willow thus circumstanced, standing near the river Teme, in the vicinity of Tenbury, Worcestershire (see fig. 58). If a tree standing upon the river-bank, close to the water, gets its roots exposed by the bank being washed away, these roots become leafy, and form so many fresh stems, with a bush of verdure as the process goes on. In this way the tree becomes duplicated; the upper portion above the bank, while the lower is below it, and partly in the water. Sometimes, while the bole of a willow has from some cause become decayed and utterly dead, the lower part next the ground retains vitality, throwing out a maze of shoots that

surround and protect the decrepitated old rotting bole.

Another way in which aged willows are resuscitated, is by their power of sending down roots from the head within the hollow bole into the soil, thus giving fresh anchorage to the old tree; and when the decayed shell at last gives way to age and time, a scion of the demolished tree is left to occupy the ground, and to take the place of its departed sire. I have here given representations of two hollow willows standing on the banks of the river Teme, near Pawick, Worcestershire, which well exemplify the process of roots descending into the ground from above, within the hollow tree. The willow is thus invigorated with new life, and resists for many years the wintry gales that would otherwise have overthrown it (see figs. 59 and 60). Modern writers

Fig. 60. Hollow trunk of willow near Pawick.

have taken little note of this mode of growth, though it was remarked by Evelyn, in his "Sylva," many years ago. He says: "Trees will likewise grow frequently out of the bole of the other; and some roots will penetrate through the whole length of the trunk, and, fastening in the very earth, they burst the including tree, as it has happened in willows, where an ash-tree has sprung likely from some key or seed dropt upon the head of it." Evelyn's observation, however, rather applies to the roots of trees that have got fortuitously upon the heads of pollard willows, and there vegetated, and not to the resuscitated growth of the willow within itself, as I have here described. But Dr. Plot, in his "Natural History of Oxfordshire," has mentioned an elm, "hollow as a drum, and decorticated at the base," which, as I have mentioned in the Willow, had "let down roots all the length of this empty case, which striking when they came to the earth, from whence it derived nourishment, maintaining a flourishing top, and has till now passed for a little miracle." This curious elm does not appear to have been noticed since Dr. Plot's time, and I fear is not now in existence. A few other trees throw down roots in this remarkable manner, but it is most obvious in the willow.

Green Hill Summit, Worcester.

THE MICROSCOPE AND MICROSCOPIC WORK.

No. V.—By F. Kitton.

WE propose in the present paper to give some account of Dr. Hooke's celebrated work the "Micrographia, or some physiological descriptions of minute bodies made by magnifying glasses, with observations and enquiries thereupon." The microscopic observations of Dr. Hooke preceded those of Leeuwenhoek several years. (The "Micrographia" was published in 1665, Leeuwenhoek's earliest work, "Anatomia, seu interiora rerum cum in animatarum ope et beneficio exquisitissimorum Microscopiorum detecta," was published in 1687. The "Micrographia" consisted of a folio volume of 246 pages, and 38 plates; the figures are inferior in accuracy to those of Leeuwenhoek, probably owing to the fact that Hooke used a compound instrument instead of a simple lens. That Hooke's figures and descriptions were thought highly of at the time, will be seen from the following remarks of Swammerdam (he is writing of Hooke's figure of the Larva of a Gnat), "que nous voyons depeints en grand dans les figures admirables de Monsieur Hook" (*sic*), page 101; and again at page 104, he says, "ainsi que l'*incomparable Monsr. Hooke* nous a decouvert le premier, &c." * Although the book and its author were thus highly esteemed, no second edition was ever required, but in 1745 a reprint of the plates and a résumé of the text was published by John Bowles, "*Printseller at the Black Horse, in Cornhill.*" This reprint was entitled "Micrographia Restaurata, or the Copper Plates of Dr. Hooke's Wonderful Discoveries by the Microscope. Reprinted and fully explained, whereby the most valuable particulars in that celebrated Author's Micrographia are brought together in a narrow Compas. And intermixed occasionally with many entertaining and instructive Discoveries and Observations in Natural History." Folio, pp. 65, plates 33. The editor of this résumé remarks in the preface, that "As these were some of the first *Drawings* of Objects examined by the *Microscope*, so likewise are they without Comparison some of the best that were ever taken in so great a number; there are no less than *Thirty-three plates*, which contain a delightful variety of Subjects largely magnified and curiously engraved. At the Time Dr. Hooke published this Work a verbose and diffused way of writing was in fashion, which seemed to us at present tedious and distasteful: the Doctrine of equivocal generation, or a spontaneous Production of many Species of Living Creatures, as well as Vegetables, without any other Parents than Accident and Putrefaction prevailed

* This is from an old French translation of Swammerdam's "History of Insects," published in Utrecht in 1682.

likewise, almost universally, and had done so for ages, however absurd it appears to us. For which Reasons it has not been judged convenient to reprint the *Micrographia*, but to give rather some short and plain Descriptions of its *Pictures* without meddling at all with its *Opinions* or *Hypotheses*."

The following list of what were considered microscopic objects two hundred years ago will not be wholly devoid of interest to the modern "microscopist."

1. The point of a small needle × 200 diameters.
2. A printed dot or Tittle do. do.
3. Edge of a Razor × 20 diameters.
4. Sparks struck from Flint and Steel.

In the description of these, the following observation occurs. "The melting of the Particles of Steel instantaneously upon the Collision is very wonderful, and comes nearly to the effects of Lightning. Indeed, there seems to be in Iron or Steel a sulphureous combustible matter very easily put in Action; for either hammering, filing or rubbing it with violence, will presently make it so hot as to be able to burn one's Finger."

5. Structure of several sorts of Hairs.

"Our author says, that as far as he could find, Human Hairs are all solid cylindrical bodies not pervious like a Cane or Bulrush, but without any Pith or Distinction of Rind, and imagines those who assert them to be hollow, have not inspected them with sufficient Care. Dr. Power on the contrary makes no doubt that every one of our hairs is hollow, which though our glasses cannot demonstrate by reason of their Transparency, is palpably evinced by that Disease in Poland, called the *Plica*, where Blood drops from the ends of the Hairs of the Head, and likewise issues out whenever they are cut, which he thinks infallibly proves the tubulous Cavity of them. But to this Dr. Hook answers that the Microscope gives no Encouragement to believe our Hairs hollow, and that the very Essence of the Distemper called the *Plica Polonica* may be their growing hollow and of an unnatural Constitution. Malpighi asserts the Hairs of animals to be tubular, that is composed of a Number of minute Tubes or Pipes. Mr. Leeuwenhoek tells us that an Human Hair cut transversely shews a Variety of Vessels in regular Figures." Disputes, in reference to minute structure as revealed by the microscope, occurred in those days, even as now, the difference only consisting in the delicacy of the test: then, it was the tubular or non-tubular structure of the hair; now, it is as to the existence or non-existence of beading on the markings of a podura scale, or whether the longitudinal lines of *Frustulia saxonica* are capable of resolution, or whether what are so called are spurious and caused by diffraction.

6. A pretty minute Shell found amongst sand.

The figure represents a small Foraminifer, possibly a Rotalia, of which the following description is given. "This Shell appeared to the naked Eye like a white Spot no bigger than the point of a Pin, but when viewed by the Microscope it was found in every Particular to resemble the flat spiral Shell of a Water Snail, and had Wreathings (what we now know as chambers), all diminishing gradually towards the Middle or Centre, where there was a very small round white Spot. 'Twas not easy to discover whether it was hollow or not, but it rather seemed to be filled with somewhat, and probably might be petrified, as larger Shells are often.

"The Object under Observation informs us of another *genus* where the Almighty Hand of the Maker is amazingly exemplified in the Minuteness and Elegance of the work. For we hereby find that the same Power which contrived such minute Insects as Mites, such minute Fishes as the Eels in Vinegar, and such minute Vegetables as Moss and Mouldiness, has likewise formed a Tribe of such minute shells as this before us, the Beauty of which could never have been discovered without the Microscope's Assistance. It was found accidentally amongst some white Sand that was looked at with no other Design than to try the goodness of some Glasses. But many valuable Discoveries have been owing to lucky Accident."

7. "Some curious Forms of small Diamonds or shining Sparks in Flints."

We need scarcely observe that these small diamonds are only crystals of quartz of very frequent occurrence in the cavities of flint.

8. The forms of Gravel in urine.
9. Snow-flakes and Ice Crystals.
10. A piece of Kettering-stone.

The figure represents a fragment of oolitic limestone.

11. The configuration of Spunge.

Dr. Hooke, in his description of the structure of spunge, quotes a passage from Bellonius' 2nd book de Aquatilibus, chapter II., which we reproduce. "*Spunges* in the Sea are extremely different from what they are when dry, sticking to the Rocks, as many Species of the *Fungi* do to Trees two or three Foot sometimes under the Sea Water, tho' now and then not above four inches. Those Hollows which we see empty in *Spunges*, or in dry *Spunges* washed and wrung out, are filled whilst on the Rocks with a filthy Liquor, or rather Jelly-like Matter, which stinks enough to make one sick, even at a considerable Distance. ARISTOTLE supposed them to have some kind of Life from their manner of fixing themselves to the Rocks, whence, says he, it is very difficult to pull them away, unless they are taken as it were by Surprise, for at the Approach of anybody to lay hold on them, they contract immediately and fasten themselves so as not to be removed without a great deal of Trouble. They do the same whenever there are Storms and Tempests. The nasty Matter before mentioned may be supposed given them by Nature

instead of Flesh, and the larger cavities seem a sort of Bowels or Intestines to them."

12. A piece of Charcoal.

13. A piece of Petrified Wood.

14. The Pores in Cork.

15. The Sensible Plant.

16. The form of Blue or White Mould.

17. Small Wall Moss.

18. The configuration of a beautiful Sea Moss.

This is a very accurate representation of a portion of *Flustra foliacea*, but which the doctor, on the authority of Mr. Ray, calls a *Fucus* or *Sea-wrack*.

19. A piece of Rosemary Leaf.

20. Fine Lawn.

21. A piece of Stinging Nettle.

The doctor performs the following experiment, in order to detect how nettles sting:—"Having provided a single Glass whose Focus was at the Distance of above half an Inch fastened in a little Frame that it might be managed easily, he perceived by the Help thereof, that on thrusting his Finger gently against the Ends of a Nettle's Prickles, they did not bend in the least, but he could discern a Liquor rising towards the Points thereof, or sinking in them according to the Degree of Pressure, and on taking away his Hand, he could see it subside entirely into the little Bladder at the Bottom, and that as plainly as he had ever seen Water ascend and descend in a Tube of Glass."

22. The Beard of Wild Oat.

23. Transverse section of do.

24. Seeds of Venus's Looking-glass.

25. Seeds of Thyme.

26. Seeds of Poppy.

27. Seeds of Purslane. These are said to resemble a Nautilus or Sailor-shell.

28. Scale of a Sole.

29. Piece of the Skin of do.

30. Couhage.

31. The Sting of a Bee.

32. A minute part of a Goose's Feather.

33. Two parts of a Goose's Quill.

34. Parts of a Peacock's Feather.

35. The Foot of a Fly. "The foot of a fly," he tells us, "consists of three joints, two Talons, and as many Pattens, Soles or Spunges, as they are called by some. By the wonderful contrivance of which Instrument this Creature is able to walk perpendicularly upwards, even against the sides of Glass, nay, to suspend itself and walk with its Body downward on the Ceilings of Rooms, &c.

36. Part of a Fly's Eye.

37. Part of a Fly's Wing.

38. The Eye and Head of a Drone Fly. This figure is more than 9 inches in diameter.

39. A Blue Bottle or Flesh Fly.

The writer falls into the same error as Leeuwenhoek, in supposing the trachea to be veins: he says, "Upon opening a Fly, numberless veins may be discovered dispersed over the Surface of its Intestines, for the Veins being blackish, and the Intestines white, they are plainly visible by the Microscope, though two hundred thousand times slenderer than the Hairs of a Man's Beard."

"Was it not from a preposterous Humour in Mankind, that constantly inclines us to despise and overlook whatever is continually before us, we should often divert ourselves with observing the pretty Actions of this little familar Animal, which are very well worth our notice. To see it like a little Bird taking its Flight about us, and when it thinks fit to settle, using its Fore-feet to clear its Body, Head, and Wings, and afterwards rubbing them backwards and forwards one against the other, to clear away any Dirt that may be contracted in making the other parts clean. To see its manner of feeding, the Motions of its little Members, and the delicate structure and Contrivance of them . . . . must fill the Mind with Delight and Admiration."

40. A Fly Wing.

41. The Jaw Bone and Teeth of a Snail.

"The Teeth are all joined together like the Teeth of a *Rhinoceros*, which perhaps is the only known Animal besides that has them in that manner."

This is the chitonous mandible present in many of the mollusca.

42. A Silk Worm's Egg.

In the text, directions are given how to breed silkworms in England, and how to wind off the silk. A description of the silkworm's manner of making silk, and also a description of the spermatozoa.

43. Eels in Vinegar.

44. The Nymph Worm of a Gnat.

45. The Nympha or Aurelia of do.

46. The Tufted or Brush-horned do.

47. The great-bellyed or Female Gnat.

48. The white Feather-winged Moth.

49. The Back of the long-legged Spider.

50. The Eyes of do.

51. The Belly of do.

52. The Ant, Emmet, or Pismire.

53. The Wandering Mite.

54. The Crab-like Insect.

55. Cloth Worm or Moth.

Dr. Hooke's figure, which is a very good one, does not represent the larval form of the clothes moth, but a perfect apterous insect, viz. *Lepisma saccharina*. The compiler of the "Micrographia restaurata," however, is responsible for the error, as Dr. Hooke called it the *Book-worm*, from having often seen it running amongst books and papers. He describes it as of a white shining silver or pearl colour, and as commonly found lurking in holes or crannies, and whenever it is disturbed sends away very nimbly to seek some other hiding-place.

56. The Cheese-mite, upper and under surfaces.

57. A small creature hatched on a vine (apparently a Coccus).

58. The Flea.

The figure of this insect is nearly 17 inches in length, and is really a very good drawing; but, of course, none of the internal structure is shown. The pygidium is indicated, but, as might be expected, no detail is given. The eye is thus described: "On each side of the head is a round and beautiful black Eye, in the middle whereof may be seen a round blackish Spot, which is the Pupil of the Eye encompassed with a greenish glittering circle or *Iris*, as bright and vivid as the Eye of a Cat. Behind the Eye is a small cavity, wherein a certain thin Film, beset with many small transparent Hairs may be observed moving to and fro, and which may probably be the Ear."

The writer concludes his description of the flea with the following advice of how to catch your flea:—"If you attempt to catch them, remember always to wet your Thumb and Finger with Spittle."

59. The Louse.

This is even more magnified than the figure of the flea, its length being nearly 20 inches. A minute description is given of this insect and its habits, but in too forcible a style to suit the fastidiousness of the modern reader. This plate concludes the work. We cannot, however, conclude our notice of the labours of the learned doctor without referring to two figures on Plate XXIV., of which Fig. 61 is a *fac-simile* of one of them.

"These, it appears, are copied from Piso's Natural History of Brazil, in which he tells the story of a Fisherman, whose Hook being entangled, contrary to his Expectation, on a Rocky Shallow not far from *Paranambuque*, brought up with it, on his pulling it out of the water, Spunges, Corals, and Sea-weeds, instead of Fish. He took Notice, amongst the rest, of a little odd-shaped Plant, about half a Foot in length, with a soft spungy roundish Body, enlarging from the Bottom upwards, after the Fashion of a Pear, and having short Roots, which had fastened it to the Rock. The Inside of it was composed of wonderful little Cells and Hollows, and its Surface was all over covered with a tenacious sticky Matter, resembling the glew of Bees. On the Top was a wide Opening or Entrance (as is shewn in the figure), so that it might properly be called *Apiarum marinum*, or a *Sea-Bee's Nest*, for as soon as it was brought to Land, it swarmed with little blewish Worms, which by the heat of the Sun were changed into small black Flies or rather Bees; but they all flying away, nothing can be asserted as to their making Honey."

"However, as the little Cells or Combs and waxy matter of Bees were evidently there without doubt the substance of the Honey itself, or whatever else is contained within them, will be discovered by the Divers, when they shall observe these Bees' Nests more curiously, and thoroughly examine them at different Seasons of the Year in the Places where they are produced." It is scarcely conceivable that 200 years ago the knowledge of Natural History was so slight, that even the great Doctor Hooke, a F.R.S., and a man of European reputation, should have taken "Occasion to enquire whether the Hulk or Case was a Plant growing before of itself at the Bottom of the Sea, out of whose putrefaction these strange kind of Maggots

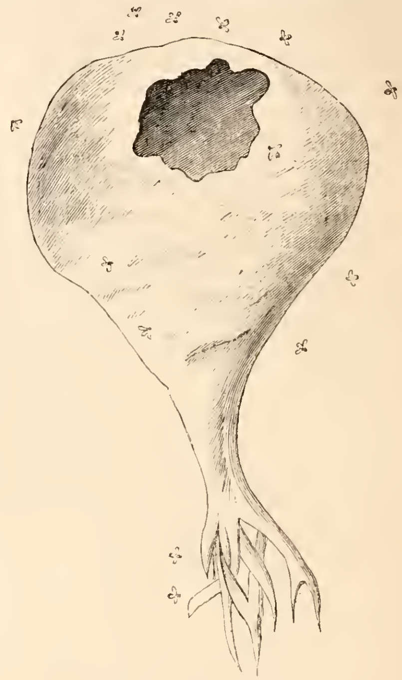

Fig. 61. *Apiarum marinum.*

might be generated? or whether the Seed of certain Bees sinking to the Bottom might there naturally form itself that vegetable Hive and take root? or whether it might not be placed there by some Fly diving, or whether it might not be some peculiar Propriety (*sic*) of that Plant whereby it might ripen or form its vegetable Juice into an Animal Substance? or whether it may not be of the Nature of a Spunge or rather a Spunge of the Nature of this?" The learned doctor has, no doubt, hit upon the true solution of this mysterious production at last.

(*To be continued.*)

MICROSCOPY.

Microscopic Fungi in Ferneries.—An interesting paper on this subject was recently read before the Oldham Microscopical Society, by the hon. sec., Mr. Pullinger. He stated that in the autumn of 1874 a rockery was constructed in a greenhouse, and backed up with peat, &c., for the culture of

British ferns; certain roots and stumps of trees in an advanced state of decay being built in amongst the stone. Early in the spring of 1875 a number of minute, beautifully-formed bodies made their appearance on one of the stumps, resembling very small round-headed pins pricked into the wood. They were pulpy in consistence, and of a lemon-colour, which gradually deepened into a brown, and then assumed a metallic steel-grey lustre, their interior being full of spores and threads. On investigation these were found to be fungi of the Myxogastric family, and genus Didymium. In the month of May he noticed upon the same stump some small masses of a white substance resembliug blanc-mange, irregular in form, as though dropped there out of a spoon. Three hours later the surface of the substance had assumed a vein-like appearance, somewhat swelled and interlacing, which soon changed to regularly formed granulations; the mass also seemed to have moved its position on the stump, leaving behind it a peculiar slimy substance. A visit a few hours later showed a complete transformation, for the whole mass, with the exception of the slimy film, appeared to be lifted bodily up, and supported underneath by numerous closely-packed horse-hair-like stems, the mass being thicker and the granulations more distinct, whilst the colour was opalescent. In the course of a night it became evident that the granulations were the apices of so many closely-compacted but distinct elongated cells, each of which was supported by one of the before-mentioned stems, and as the mass dried they separated from each other, until they resembled a nodding plume of feathers; the colour now being dark brown, and the outer membrane bursting, the whole soon became a dusty mass of spores, and thus the writer made his first acquaintance with *Stemonitis fusca*. Very shortly after the appearance of the Stemonitis two fresh forms were observed; one consisting of minute cylindrical heads standing on stems near but distinct from each other; they were of the same colour and consistence as the blanc-mange-like mass before mentioned; in a few hours they turned pink, and finally assumed a bright vermilion colour, and in a few days the rupture of the peridium displayed the elastic threads of the capillitium, which maintained the same shape as before bursting, but was much increased in bulk, and the vermilion-coloured spores scattered in all directions: this was *Arcyria punicea*. A cluster of globular bodies about the size of small marbles next appeared, of a beautiful pinkish flesh-colour, which deepened to a salmon-colour, and finally became drab. At first they were full of flesh-coloured liquid, and the following morning a single drop of liquid, clear as water, stood on the crown of each, as though it had excreted, but no rupture was visible, and in a few days they had become filled with spores and threads, which puffed out as the common puff-ball; this was *Lycogala epidendron*. Other varieties simultaneously appeared, until the number was swelled to eight remarkable specimens, all of which grew within a few inches of each other on the same stump, and represented no less than six genera of the order Myxogastres, the following being their names: *Arcyria panicea*, *Arcyria nutans*, *Stemonitis fusca*, *Lycogala epidendron*, *Physarum nutans*; Didymium—*Trichia turbinata*, *Trichia chrysosperma*.

Report on the Irish Diatomaceæ, by the Rev. Eugene O'Meara, M.A. Part I.*—Nearly a quarter of a century has passed away since the appearance of vol. i. of Smith's "Synopsis of the British Diatomaceæ," and nearly twenty years have elapsed since its completion: from that period until the present time no work has appeared describing systematically the Diatoms occurring in the British islands. Only scattered papers have from time to time appeared in various scientific serials, noting the occurrence of new forms. We were therefore pleased to learn that a report on the Diatomaceæ of Ireland was in hand, the first part of which is now published. The author has adopted the system of Heiberg (*see* "Dansk Diatomeer"), which he says "appears to me to have most to recommend it, founded on the symmetrical or unsymmetrical structure of the frustules in their various aspects. There are two principal aspects in which a diatomaceous frustule may be regarded,—the front view, in which the hoop or connecting band is presented to the eye; and the side view, in which one or other of the valves is under observation; and in both these positions the longitudinal and transverse axes are to be considered. If in the two positions, and in these varied views, exact symmetry obtains, the frustule is said to be symmetrical in all its aspects, but if the two opposite valves are not uniform, or the portions of the valves on either side of the transverse or longitudinal axis, on a side view or front view, do not exhibit the same proportions or outline, the frustule is said to be unsymmetrical on that view or axis on which the difference of form is observable. Such is the ground-plan of Heiberg's systematic arrangement, and which I have adopted in the present report. It is not indeed wholly free from objections to which other systems are liable, and possibly may be open to others peculiarly its own; but still the principle on which this arrangement is based commends itself as being at once more simple, more comprehensive, and most easily applied."

The division is certainly open to the objection

* Only 100 copies have been reprinted from the "Proceedings of the Royal Irish Academy" (for whom the report was written), and when these are disposed of, no separate copies will be obtainable. At present copies can be procured of the author (price 7s. 6d.), Rev. E. O'Meara, Newcastle Rectory, Hazelhatch, Dublin.

that many forms now considered as belonging to the same genus, must, if this arrangement be adopted, be separated. For example, *Triceratium Montereyii*, and at least two species of Stictodiscus, cannot be with propriety retained in their respective genera. In these species the two valves of the frustule are unsymmetrical; one of them being bullate at the centre, and the other flat, or only slightly convex. The genera included in this part are the following: *Melosira, Lysigonium, Podosira, Orthosira, Cyclotella, Coscinodiscus, Arachnoidiscus, Actinoptychus, Craspedodiscus, Omphalopelta, Actinocyclus, Eupodiscus, Auliscus, Odontodiscus, Biddulphia, Triceratium, Amphitetras, Trinacria, Isthmia, Fragilaria, Denticula, Odontidium, Dimeregramma, Plagiogramma, Diatoma, Ralfsia*, N.G., *Rhaphoneis, Synedra, Grammatophora, Tabellaria, Tetracyclus, Rhabdonema, Striatella, Tessella, Amphipleura, Mastogloia, Dickieia, Collectonema, Berkeleya, Schizonema, Diadesmis, Brebissonia, Navicula*,—in all forty-three genera. It will be observed that the author has reinstated the old genus Lysigonium to receive the following forms:—*Melosira nummuloides, M. Westii*, and *Lysigonium Wrightii*. The genus Trinacria is given as an Irish diatom on the authority of a single specimen found in a mounted preparation from the Arran islands. As this is a fossil form, occurring in abundance in the "Mors deposit," it is probable that the single valve was an interloper. I may here remark that *T. regina* is identical with *Triceratium solenoceros*, Ehr., and and *T. Kittonianum*, Grev. I fear *Craspedodiscus* and *Arachnoidiscus* have as little claim to a place among English or Irish diatoms, as the preceding species. The N.G. *Ralfsia* must be deleted, as there is already a genus of marine algæ (belonging to the family Mesoglocaceæ), bearing that name (*see* Kützing's "Species Algarum," p. 543). The text occupies 190 pages, and there are 9 plates, containing 329 figures. We are sorry that little can be said in their favour: in many instances they are simply misleading. To justify these remarks we will give the following examples: *Synedra superba*, with costæ as distant as those on *Pinnularia alpina; Coscinodiscus centralis*, with large, distant, moniliform markings; *Navicula cardinalis*, with the margins inflated (all our specimens have the sides perfectly straight). The text will be found generally accurate, and the descriptions are brief but lucid, and it is very much to be regretted that some competent artist could not have been found to give tolerably accurate figures of the forms described in the book. The art of representing diatomaceous forms seems to be lost in this country.—*F. Kitton.*

THE "EOZOON CANADENSE."—In the *Annals and Magazine of Natural History* for April there is a capital translation, by Mr. W. S. Dallas, F.L.S., of Otto Hahn's "Micro-geological Investigation of *Eozoan Canadense*," the "Dawn animalcule" of the Laurentian rocks. Otto Hahn considers it in its geological, zoological, and mineralogical bearings, and comes to the very definite conclusion that the *Eozoon* is a myth, founded on mistaken conclusions as to the micro-geological characters of certain serpentines.

POLARIZATION OF LIVING TISSUES.—Some time since, while examining the contents of a "microscopic" aquarium, I tried the effect of the polariscope on the *Daphnia pulex*, expecting to find the shell would polarize in a similar manner to the ova of the oyster. I was very much surprised to find the shell not affected, but the *body itself;* the intestines and muscles of the tail and antennæ showed a greater intensity of colour than almost any object I had ever seen polarized. I have at different times examined several specimens of Crustacea, Cypridina, Polyphemidæ, &c., and always with the same results. The young of many water-beetles are also good examples; in fact, from the observations I have made, I think there is no doubt that living tissues generally will polarize in some degree. The leaves of many aquatic plants examined while living form very striking objects for the polariscope.—*W. C. H. B., Ives.*

EXPERIMENTS ON SPONTANEOUS GENERATION.—In the *Popular Science Review* for April there is a capitally-written and well-illustrated article by the Rev. W. H. Dallinger, already well known for his researches in the life-history of the monads, giving a review of Professor Tyndall's "Experiments in Spontaneous Generation," and Dr. Bastian's position thereto. The author thinks that as to the development of *Bacteria* in infusions charged with solid matter, precise experiment of a sufficiently comprehensive character has yet to be made on them in relation to the demonstrated germs. Mr. Dallinger sums up against Dr. Bastian's theory.

ZOOLOGY.

CAMBERWELL BEAUTY.—On Friday, March 10th, a female Camberwell Beauty (*Vanessa Antiopa*) was caught near Padiham, Lancashire, by Mr. V. H. Lucas, being the first ever known to be caught in this neighbourhood.—*W. Wilcox.*

NATURAL HISTORY ABROAD.—In an exceedingly well-written and scholarly article which appeared in the *Fortnightly Review* for January, we have a good illustration of the usefulness of how even a slight knowledge of Natural History might prevent an author from committing egregious blunders. The writer, speaking of the passive endurance of the lower animals to pain, treats us to the following:—"We are all familiar . . . . with narratives of moths, having pins in their bodies, which have

yet continued to get about and devour their more securely transfixed neighbours." This manifestation of a carnivorous appetite in moths will be new to our entomological readers!

Sphinx Convolvuli in Orkney.—Mr. J. T. Boswell writes to the *Scottish Naturalist* for April to say that in the autumn of last year *Sphinx Convolvuli* was abundant in Swantistex, on the south coast of the mainland of Orkney, about halfway between Kirkwall and Stromness. The first was taken on the 12th of August, and several were seen on succeeding nights. Mr. Boswell caught ten specimens, hovering over the honeysuckle and single pheasant's-eye pinks. They were all in fine condition, and there seems to have been no doubt they were bred in Orkney, but the writer is doubtful as to what the larva fed upon, as no species of convolvulus grows in the island.

Teeth of Fly.—The slide labelled "Teeth of a Fly" is not inaccurately named. It is a portion of the fly's proboscis, in the region of the oral aperture; the so-called teeth, which would be more properly named scrapers, are bifurcate rods, arranged in three rows (see figure in *Monthly Microscopical Journal*, vol. i. pl. 16, fig. 4). Their function is that of scraping and grinding hard substances. The writer has examined specimens of hard amorphous sugar (caraway comfits), after flies have fed upon it, and found the surface covered with parallel scratches corresponding exactly with the distance of the so-called teeth. (See also Lowne "On the Blow-Fly," p. 48.)—*W. T. Suffolk.*

Fauna and Flora of Hastings and St. Leonards and the Neighbourhood.—The Hastings and St. Leonards Philosophical Society are desirous of obtaining accurate lists of the animals and plants of the district, and invite the co-operation of all who take an interest in the natural productions of the neighbourhood. The district to which the list is proposed to be confined may be stated roughly as including Bexhill, Battle, and Rye; but as it is able to fix definite boundaries, the district is proposed to be limited as follows:—Starting from the coast beyond Rye, the boundary of the county to be followed as far as the spot where the road from Hawkhurst to Hurstgreen meets the boundary; thence by this road to Etchingham, Burwash, the east side of Heathfield-park, Cade-street, Turner's-green, Dallington, Wood's-corner, Pont's-green, Ashburnham to the west of the Park, Ninfield, Hooe-common, south of High-wood, Little-common, to Martello-tower, No. 49, on the coast. This district comprises portions of the two districts called by Mr. Helmsley "Cuckmere" and "East Rother." The dividing-line would be Dallington, Netherfield-green, thence to Battle by the high road dividing High-wood from Battle, between Beauport and Crowhurst parks, and through Hollington by the London road, St. Leonards, to the sea. The portion of the district to the east and north of this line may be called "Lower East Rother," and that to the west of the line "East Cuckmere." It would be desirable to notice in which of these divisions (which may be easily traced on the ordnance map) any animal or plant is met with. Any persons able to assist will much oblige if they will kindly communicate with A. L. Ward, 4, St. Paul's-place, St. Leonards, or Philip Cole, 1, Linton-terrace, Hastings, Hon. Secretaries.

Self-acting Air-can for Fresh-water and Marine Animals.—In answer to "G. S." and other querists, I have much pleasure in giving the sketch and details of my self-acting air-can for aquatic animals.

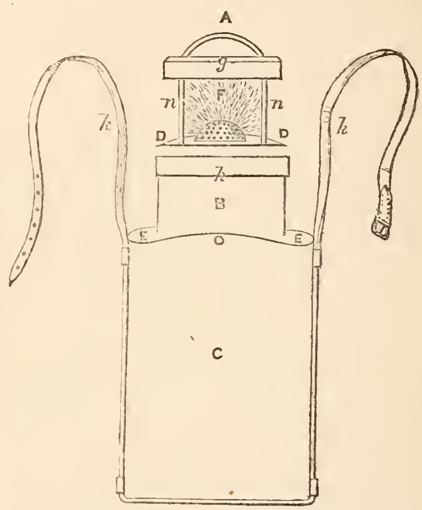

Fig. 62. Self-acting air-can for aquatic animals.

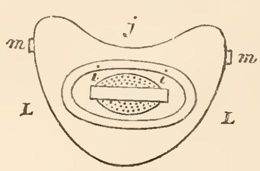

Fig. 63. Section of ditto.

A is the cover of the can; B the socket to fit the cover; C the body of the can; D D, plate with perforated raised zinc, showing the water forcing itself into the chamber F, and then going back into the can again; *g*, the top of the cover, which rests on line *h*, sinking down 1 in. below upper rim, so that water forcing its way through the upper cover-plate, also goes back into the can again through the holes, as marked in cover on the under drawing, *ii*. *j* shows the hollow, and how it is fastened to the left side by a leathern strap *k k* passing over the head to right shoulder. It can thus be worn when

riding or walking. L L is the cover of the can closed down into the socket; *m m*, tin loops to pass the leathern strap through; *n n*, pillars to hold the under plate of cover; the plate not to go below o.—*A. T. R. Sclater.*

BOTANY.

FOLK-NAMES OF PLANTS, &c.—I fancy "R.W." must be slightly mistaken in the local name he gives for Bistort (*Polygonum Bistorta*), as it is generally known here as "Easterman giants," of which Easter magianty must be a corruption, and the leaves are much used in "yarb" (herb) puddings. In some parts of Westmoreland, I believe it is called "Easter ledger." The Earth-nut (*Bunium flexuosum*) I know as "Yowe yornut" and Jacky jurnal." The scientific names are from Hooker's "British Flora." "Yellow yorlin" was a common name among schoolboys for the Yellow-hammer (*Emberiza citrenella*).—*W. D., Carlisle.*

THE FLORAL GLANDS OF PARNASSIA PALUSTRIS.—M. Heckel has recently published some remarks on this interesting subject in the *Comptes Rendus.* As is well known, these floral glands have long occupied considerable attention as to their functions. M. Heckel devoted two months last year to the observation of these glands. He says: "The most important fact which struck me at the outset, and the observation of which has led me to doubt the reality of the part ascribed to the floral glands when they are regarded as destined to attract the insects which are the agents of fecundation, is the following: The product of secretion, which is always limpid, and does not contain the pollen fallen from the extrorse anthers, far from being comparable to that of most nectaries, is not saccharine, has no peculiar odour, is sticky, and shows an acid reaction with litmus paper. A very simple experiment showed me that these glands are not indispensable to fecundation, and that, notwithstanding the defective arrangement of the anthers, this act is accomplished normally when the floral glands have been removed from the bud before arriving at their full development. Lastly, a capital fact results from prolonged observation: I have seen no insect penetrate into the perfect flowers except a few little Diptera, which, being perhaps attracted by the product of the secretion of the glands forming a barrier round the andrœcium, are immediately stuck fast by this viscous liquid. As in the *Droseræ* I have remarked that, under the influence of the irritation produced by the presence of insects, the liquid became more abundant; the animal soon died, and was broken up into its constituent parts. In order to appreciate better the action of this liquid, I applied to the largest of these glands very small pieces of raw flesh, which were at last dissolved and disappeared, in the same way as in the case of the leaves of *Pinguicula vulgaris.*" Would the fact here indicated, and which led M. Heckel to see in the floral glands of the Grass of Parnassus a carnivorous organ, be an exception in the life of the plant? M. Heckel asks whether we must see in it evidence of ancient habits which at a certain epoch characterized a whole series of plants which are unknown to us, and of which the *Parnassia palustris* would only be an isolated term?

THE POTATO DISEASE.—M. J. Berkeley writes as follows to the *Gardeners' Chronicle:*—"Since the meeting of the Linnean Society, of which a report was given in the *Gardeners' Chronicle,* March 25, 1876, Mr. Smith has forwarded to me several slides containing specimens of the organisms he found at Chiswick in 1875. Having examined them very carefully, I think it but justice to state what I have observed. 1. The oogonia seated on thick, often flexuous threads, with a septum beneath the oogonium, which is sometimes carried far down the thread. 2. Many instances in which the oogonium is produced in the middle of the thread, with a septum at either end, calling to mind the figure of Montagne's Artotrogus. In several instances a process terminated the oogonia, as if the thread was to be produced so as to leave the oogonium in the centre. 3. In one oogonium I found an echinulate body, quite as strongly echinulate as in the best specimens of Artotrogus. 4. The so-called antheridia produced on delicate threads, quite distinct from those of the oogonia, and not separated by a septum. The form of the antheridia is exactly what Smith has figured. 5. The antheridia in contact with the oogonia, in one instance the wall of the oogonium being perforated, as if by the act of impregnation. I cannot, however, speak more positively on this point. 6. Abundant Peronospora; threads and spores mixed with the oogonia and antheridia. Of course Mr. Smith's interpretation of what he has seen is subject to criticism, but his good faith is so far confirmed by his specimens that criticism should be very guarded and gentle. If I may express my own opinion, I believe that all these objects belong to one category; and if so, I should be ready to receive De Bary's Phytophthora (plant-pestilence) as a good genus, differing in several respects from Peronospora."

GEOLOGY.

THE PROGRESS OF GEOLOGY.—We have received the sixth part of the fourth volume of the "Proceedings of the Geologists' Association," containing a capital paper by Mr. D. C. Davies, F.G.S., on "Some of the Causes which have helped to shape

the Land on the North Wales Border"; and a long and thoroughly exhaustive paper by Mr. W. H. Hudleston, F.G.S., on "The Yorkshire Oolites." The second part of the fourteenth volume of the Manchester Geological Society's Transactions is also to hand, containing articles by Mr. John Aitkin, F.G.S., on the Drift Deposits on the Western Pennine Slopes of the upper Drainage of the rivers Calder and Irwell, with some suggestions as to the cause of the partial absence of drift on the eastern slopes. Mr. John Plant, F.G.S., has a paper describing the submerged forest near Holmfirth.

Carbonic Acid in the Atmosphere.—I have often met with the assertion that the absence of air-breathing animals from the palæontology of periods below the Carboniferous, supposing the record to be sufficiently perfect for us to be satisfied as to the fact, is to be accounted for by the consideration that before the vast amounts of carbon which we find in the coal deposits of the globe were thus *fixed* (if you will allow me to use a term of the old alchemists which seems aptly to express my meaning), it must have existed, at least in great measure, in the atmosphere in the form of carbonic acid gas, rendering this atmosphere quite unfit for the breathing of animals furnished with lungs. It occurs to me that, however slowly, the agency of man is yet surely deoxidizing this carbon as we consume our supply of coal, sending forth into the air around us vast volumes of carbonic acid gas, besides what we also send forth set free from the various limestones that are continually undergoing decomposition in our various industrial operations; and I should be glad if some of the readers of Science-Gossip, furnished with the needed experimental and practical knowledge, would inform us whether all these agencies of man are, in any appreciable manner, however minute, altering the average amount of carbonic acid gas found normally in atmospheric air? Whether with our very limited grasp of the powers of compensation of nature, and of the resources of the Creator, it is safe for us to look back to any geological period, and say that our globe was surrounded by an atmosphere materially differing in composition from that which we now breathe? Whether, looking forward to a time—far distant, I hope, but which some have speculated about—when, having burnt up all our available coal, we shall have rendered the air unfit for the breathing of animals furnished with lungs? Because, if so, we need scarcely speculate upon what fuel will be patented to answer man's various necessities now supplied by our "black diamonds."—*J. G. Halliday (Colonel)*.

"The Occurrence of the Rhætic Beds near Leicester."—This is the title of a paper read before the Geological Society by Mr. W. J. Harrison, F.G.S. The sections described are shown in brick-pits in the Spinney Hills, forming the eastern boundary of the town of Leicester, and in the Crown Hill on the eastern side of a valley excavated by the Willow Brook. In the latter locality they are capped by Lower Lias. They have a slight dip to the south-east. The brick-pits show a thickness of about 30 feet of Rhætic beds above the Triassic red marl, to which their stratification is parallel. The lowest bed is a light-coloured sandy marl about 17 feet thick, traversed by three or four courses of harder, whiter stone, and containing crystals of selenite, pseudomorphs of salt, and numerous small fish-scales. A single insect-wing was obtained from it. This bed extends across the valley of the Willow Brook, and forms the base of Crown Hill. Above it comes the Bone-bed, from 2 to 3 inches thick, containing numerous small teeth, bones, and scales of fishes and Saurians, including large vertebræ of *Ichthyosaurus*, ribs probably of *Plesiosaurus*, and some bones of Labyrinthodont character. Two species of *Axinus* also occur. The Bone-bed is followed by about 2½ feet of coarse black shales, overlain by a very thin band of hard reddish sandstone, with casts of *Axinus*, and this by about 2 feet of finely laminated black shales, containing *Cardium rhæticum*, *Avicula contorta*, and a starfish (*Ophiolepis Damesii*). Above these come about 5 feet of shales with sandy partings, the lower foot rather dark and containing *Avicula contorta*, *Cardium rhæticum*, *Ostrea liassica*, and a new *Pholidophorus;* the remainder light-coloured, but with the same shells. The topmost bed in the section is a band of nodular limestone 6 inches thick. The same sequence is observed in Crown Hill. There are indications of the existence of a second nodular limestone and of beds of light-coloured clay and sand, but obscured by drift, in which, however, blocks of limestone occur with *Monotis decussata* and *Anoplophora musculoides*. The author indicates other localities where traces of the Rhætic beds are to be seen, and states that wherever the true junction of the Trias and Lias is exposed the Rhætics appear to be invariably present.

Extinct Mammals.—Professor Flower, F.R.S., in a lecture at the Royal Institution, gave an account of the discoveries recently made of a vast number of fossil remains of animals which lived in North America during the Tertiary period, especially those found in the Eocene strata of Wyoming, Colorado, and New Mexico, only explored since 1869, chiefly by the United States geological survey of the territories under Dr. F. V. Hayden. Of the remains particularly selected for description, many are of animals unlike any now existing, or found fossil elsewhere, and many constitute connecting links between living forms now widely separated

There are also many, the relations of which have not yet been satisfactorily determined. Among the most remarkable of these animals are a number of gigantic species, to the first-discovered of which the name *Uintathereum* was applied—from the Uintah mountains, near which it was found—in form and size somewhat intermediate between the elephant and the rhinoceros, but differing in some respects from both, and having three pairs of great horn-like projections on the top of the head, and huge trenchant canine tusks. These animals, which were entirely unknown five years ago, have been found in such abundance that the museum of Yale College alone now contains remains of more than a hundred individuals, some of them in excellent preservation. There are also large rhinoceros-like animals with a pair of horns side by side on the nose, and various new kinds of carnivora, rodents, and lemurs. Many new forms of the Horse and of the Camel family have also been found, some of which we have already referred to in Science-Gossip.

Columnar, Fissile, and Spheroidal Structure of Igneous Rocks.—The Rev. T. G. Bonney, M.A., F.G.S., has recently read a paper on this subject before the Geological Society of London. Some of the above structures have recently been discussed by Mr. Mallet and Professor J. Thomson. Both these authors agree in attributing columnar structure to contraction due to loss of heat while cooling, but differ in their explanation of cross jointing and spheroidal structure. Mr. Bonney showed that the principle proved by Mr. Mallet to be the explanation of the columnar structure is capable of a wider application. After a brief notice of some instances of columnar structure, he described cases of a fissile structure seen in certain igneous rocks (especially in the Auvergne phonolites), closely resembling true cleavage, and often mistaken for it; also the tabular jointing of rocks: a peculiar form of this, where most of the segments are of a flattened convexo-concave form; spheroidal structure and cup-and-ball structure. He showed by examples that Professor Thomson's explanation of spheroidal structure was inadequate, and gave reasons for considering all these structures to be due to contraction. He also discussed more particularly the cup-and-ball structure, giving reasons for thinking that the spheroidal and the horizontal fissures were often to some extent independent of each other.

NOTES AND QUERIES.

American Birds' Eggs.—Would any of your numerous American readers kindly furnish me (through Science-Gossip) with the address of any naturalist, or any one resident in America, from whom I can purchase American birds' eggs?—*T. W. Dealy*, 142, *Clarance-street, Sheffield.*

Fritillaria Meleagris.—Can any of your correspondents inform me of a locality for this beautiful flower? It is stated by Bentham that it occurs in some of the southern and eastern counties in a wild state; but I do not believe it is to be found throughout Hampshire. I should esteem it a favour if any one would send me a plant, and would gladly pay postage for it.—*Joseph Anderson, jun., Chichester, Sussex.*

Notes on Natural History at Pomeroy, Co. Tyrone.—Jan. 25th, Song Thrush commenced to sing. March 1st, Frogs spawning. The saying common in this neighbourhood is: "Blackbird or Thrush which sings before Candlemas will be sure to mourn many days afterwards."—*Sl. Arthur Brenan, Clk., Cloughban.*

Folk-lore of Plants.—"Culverkeys and Gander-grass."—Johnson, in his Dictionary, gives another quotation from "The Compleat Angler," which will, perhaps, help us. "Looking down the meadow, I could see a girl cropping cowslips and culverkeys to make garlands." *Culverkeys*, then, is evidently a spring flower, growing in low meadows, and of a blue colour. There is but one British plant which corresponds with this, and that is the *Hyacinthus non-scriptus.* Would E. Edwards kindly say if the couplet identifying culverkeys with pigeon peas is now to be heard, or is it copied from some book? Culver is, undoubtedly, the dove, but key means, beyond its usual sense, the fruit of the ash, and, formerly, the principal claw of a hawk's foot. If it means a seed-vessel, it is not necessary to look for a fruit that resembles a key, but for a fruit that resembles a dove. I think the more probable meaning is that of dove's claws. On the strength of this meaning the Culverkey has been identified with the Columbine, to which it would be certainly applicable; the chief difficulty being that it is generally a wood plant. The lines quoted by Mrs. Edwards make a difficulty in accepting the Hyacinth as the Culverkey, as only two lines before, "the Red Hyacinth" is mentioned. In Awbrey's Wilts, the Culverkey is mentioned, which, I suppose, is the same. Gander-grass can hardly be identified as Goose-grass, for that plant is a summer inhabitant of hedges, and its flowers are surely not sufficiently conspicuous to make it a companion of the red Hyacinth and yellow Daffodil. "Purple Narcissus like the morning rays." Has any one, by the bye, ever seen geese eating the *Galium Aparine?* And the same with *Goose-tansy* (*Potentilla anserina*). I must admit I can produce no better explanation of Gander-grass. Perhaps some other casual note in "The Compleat Angler" may throw some light on it. *The Nettle.*—I heard the other day of a curious use to which the nettle is put in Guernsey. An infusion of the fresh plant is used to make ginger-beer instead of water. It makes the ginger-beer very refreshing, and gives it a peculiar pleasant flavour. Is Nettle-thread still used in any part of Europe? *Local and old names of Plants.*—In an old dictionary I possess, by Phillips, the nephew of Milton, occurs the following: "*Gander-gosses*: an herb." What herb can this be? In Wright and Halliwell's "Provincial Dictionary," *Gandergoose* is given as equivalent to *Ragwort.* This can hardly be the same as Gander-grass, but may be *Gandergosses.* In Wright and Halliwell's Dictionary the name Bat-in-water is given as equivalent to Water-mint. In a manuscript list of names, lent me by one of your corre-

spondents, the same name occurs in the writing of the Rev. Gillett, late of Runham. He was also a correspondent of Wright's, and, we may assume, that he is the authority for the name. He was a good botanist and philologist; so the authority is unimpeachable. Has any one ever met with this name in use, or can any one explain it? In Guernsey and, I suppose, in the Channel Isles generally, the *Galium Aparine* is called Lakoo; the *a* as in *pack*, and the *oo* as in *food*. The children have a particular day for gathering the plant and sticking it on the dresses of their elders. My informant, however, could not tell me what was the day. In the Isle of Wight it is called Chivers. Can any one explain Lakoo, or adduce any name resembling it?—*W. G. Piper.*

Brown Toad.—One day, on Tooting Common, I observed a fine light-brown (with a shade of light liver-colour) toad, of about 3½ inches in length. Could any one give me evidence as to its being common to find toads of this colour I should be much obliged.—*J. H. B. Brooke.*

Spiders: Do They utter Sounds?—On going into a lumber-room in the evening and lighting the gas I hear a curious sound emitted at short intervals, which I can only represent by Tchink. It is not like mice, crickets, or beetles, and appears to proceed from some dusty shelves on which are some dirty webs with the large hairy house-spider; the noise, in fact, appears to proceed from them. Is this likely to be the case?—*H. F., Junr.*

Fresh-water Tortoise.—In August last I was told a small tortoise had been seen basking on a large stone standing in a pond in the garden; a day or so after I saw it there myself; it was about three inches over, and very handsome, with bright golden spots on its neck. I watched it off and on all that day; it dropped into the water when any one came in sight, but was up again on the stone in about twenty minutes. As the stone was very steep and the season dry, the pond getting lower every day, I thought it would soon be unable to scramble up: so next day I got a large flat stone and laid it slanting next the old stone, and made a shingle beach so that it might come out at all times in comfort; but this interference seems to have disgusted it, as it has never been seen since. In trying to account for its coming there I recollected that some years ago (I forget how many) I bought two small (I think they called them scarce) tortoises, one about the size of a crown-piece, the other a little larger, and put them into a pool in a greenhouse fernery about 130 ft. from this pond: one soon died and the other disappeared; so I presume it must be the present visitor. I should like to know if any reader of Science-Gossip has had experience of tortoises living out of doors in this climate. This one must have done so for some years, and it shows how strange things may frequent places under your very nose without being observed. The pond is swarming with sticklebacks and water-snails, so there is plenty of food for him. —*H. F., Junr.*

The Juniper.—In that popular little work entitled "Our Woodlands, Heath, and Hedges," by W. S. Coleman, it is stated "the juniper (*Juniperus communis*) in its wild state is a low shrub seldom more than three feet high, but when planted in a very favourable soil it will often rise to the dimensions of a tree. At Wardour Castle, in Wiltshire, is one (the largest in England) thirty feet in height." Is this tree now living? Perhaps some of the readers of Science-Gossip can tell.—*F. S.*

Cochineal.—A number of dark spots may often be found on the young bark of the ash-tree about the size of a pin's head. If these be carefully removed, a number of eggs of a scarlet colour will be found in them. They belong to a small species of cochineal insect, but very much smaller than the insect of commerce. Is it known by name?—*E. T. Scott.*

Crocus.—As I was the first to refer to the change of colour of the crocus to yellow from blue or purple, I perhaps may be again excused if I say, with reference to Dr. Morton's article, that mine were not mixed in planting, and that one year is not a sufficient time for the seeds to grow and blossom. One year they were blue, the next all yellow, with hardly an exception. They are in the ground just as they were, and I shall soon see if any further alteration takes place. I am glad Mr. Thirkel could corroborate me.—*E. T. Scott.*

Silkworms.—Would any reader kindly inform me how to manage silkworms? I have a quantity of eggs, and am anxious to know what treatment they require.—*Inquirer.*

Leucojum æstivum.—That rare plant the *Leucojum æstivum* is said to grow on the Kentish shore, somewhere near Greenwich. I have sought it carefully, more than one season, without success. If any of your numerous correspondents would tell me the exact locality, I should feel truly obliged. If I were communicated with privately, I would engage not to abuse the confidence, either in taking much or making the locality known.—*H. E. Wilkinson, Anerley, S. E.*

Boat-flies.—I should be glad if any of your readers have remarked and can explain the peculiar sound made by boat-flies (*Notonecta*) at this season of the year. I have several in a fresh-water aquarium, and notice that by a peculiar movement of the anterior feet,—I have thought by rasping them on a series of plates at the point of the proboscis,—they emit a sound like crik-kick-kick, continuing for about twenty seconds. This stridulation can be heard several feet from the aquarium, and is only made, as far as I have observed, while the fly is at rest.—*Tom Workman.*

Juniper Bushes.—"T. C.," who has seen a number of juniper bushes on the downs near Steyning, asks whether they exist in a wild state elsewhere in Sussex. It is a curious fact that this shrub is exceedingly rare eastward of Brighton; but it is abundant on some parts of the downs in West Sussex—at West Stokes, for instance, on the downs above Kingley Vale; it is associated with yew, holly, and stunted oak. I know only of a few solitary bushes eastward of Brighton.—*W. B. Hemsley, Richmond.*

Voracity of Fish.—Some fish are notoriously voracious. Is the haddock generally included in the list? Upon one being opened the other day, preparatory to cooking, much surprise was occasioned by its being found to contain a nearly full-grown herring. I thought subsequently to obtain some further particulars, but the two fish having been meanwhile placed outside the house, I only came in time to see a cat licking its jaws and one fish gone. I dare say the other soon followed suit.—*W. J. Horn.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

W. Tarrow.—The specimen found in copse was the "Wood Forget-me-not" (*Myosotis sylvaticum*).

A. M. C.—Get Gould's "Mammals of Australia," published, we believe, by Van Voorst. You may see it at the Library of the British Museum.

A. L. P. H.—The shells in the quill, called "Rice Shells," are *Oliva oryza*; the white ones are a species of *Marginella*.

C. W. A.—Your *Palmipes* with six rays is, undoubtedly, a monstrosity of *P. membranaceus*. *Pinnotheres pisum* differs from *P. veterum* in that the front of the male of the former projects. The female *pisum* has the abdomen broader than long, whilst that of *veterum* is longer than broad. In the male of *veterum* the carapace is subquadrate, rounded, and the front slightly emarginate. The carapace of the female *pisum* is uniformly rounded at the anterior margin.

J. W. Mee.—The best way to preserve your wood will be to creosote it.

Cephas.—Wood's "Insects Abroad" is published at 16s. by Longmans & Co. "Out and About" is by Hain Friswell, and published by Groombridge at 3s. 6d. Huxley's "Lessons in Elementary Physiology" is published by Macmillan at 4s. 6d. We should think you could obtain a frog's skeleton from any natural history dealer in London.

Dubins.—The objects you mention embedded in the peel of orange are the pupa-cases of *Ceratites citriperda*.

H. W. Hollenburgh.—*Copaline* or *Copalite*, the fossil resin found in the London clay, might be obtained, we should think, from Tennant's shop, 149, Strand, London.

E. Halse.—Article will appear shortly.

F. T. P.—We do not know of anything that will prevent mice eating crocus-bulbs. Perhaps some of our readers may, and will communicate with us concerning it.

A. S.—*Melicerta* signifies the "Honey Floscularia." The book you name has not much value as a scientific work. You had better see Carpenter's "Animal Physiology," or Rhymer Jones's "General Structure of the Animal Kingdom."

T. Rogers.—Your specimen is a form of *Sphagnum acutifolium*.

J. Maxwell.—Your mosses are as follows:—1. *Sphagnum cymbifolium*; 2. *Dicranella heteromalla*; 3. *Trichocolea tomentella*; 4. *Thamnium alopecurum*; 5. *Pogonatum aloides*; 6. *Mnium punctatum*.—R. B.

E. Edwards.—Many thanks for the early Daffodils, which came safely and welcomely to hand.

Errata.—By some means, at the last moment of going to press with the April number, the blocks illustrating Mr. Bridgman's article on "Ringing Slides" were transposed. Fig. 34 ought to read "Cell and slide seen edgeways, showing the shape of foundation"; fig. 35, "34 in section"; fig. 36, "Section of cell complete"; and fig. 37, "Section of cell with too large a cover, showing the weakness of its attachment."

Editorial.—Absence on the Continent has prevented the Editor inserting many of the later communications sent to him this month. Indeed, the amount of literary correspondence he now receives is such as to suggest the necessity of permanently enlarging Science-Gossip to an additional one-half its present size, with additional illustrations, &c. This would, of course, oblige the Publisher to issue it at 6d. instead of 4d. per month, as hitherto. Before committing ourselves to so important a change, we should be glad of the opinion of our numerous and oldest contributors and subscribers for and against.

EXCHANGES.

Rare Birds' Eggs for others not in collection. Also live Star-fish, Hermit Crabs, and Molluscs, for Birds' Eggs, Minerals, Lepidoptera, or Shells.—J. T. T. Reed, Ryhope, Sunderland.

Larvæ of *H. dominula*, *P. chrysorrhœa*, and *P. auriflua* in exchange for British marine, and land and fresh-water Shells, and Birds' Eggs.—Address, Sidney Smith, Castle-street, Walmer, Kent.

Elytra of foreign Diamond Beetles, and many species of British Lepidoptera for good mounted objects.—Joseph Anderson, jun., Stockbridge-road, Chichester, Sussex.

I have about 50 species of British Birds' Eggs to offer in exchange to American collectors (and could furnish more, if necessary), for same number of American Eggs; common species will do, even the commonest. Many of my Eggs are rare, and all well blown. List sent on application. All letters answered.—T. W. Dealy, 142, Clarence-street, Sheffield.

The whole of this Journal, and the whole of the "Monthly Microscopical Journal" for Object-glasses.—Address, W. Forgan, 3, Warriston-crescent, Edinburgh.

Wanted, one or two Specimens of *Doris tuberculata* and *Synapta*. Many things to offer, in exchange, in mounted or unmounted objects.—M. Fowler, 20, Burn-row, Slamannan, near Falkirk.

Wanted, Wood's "Insects at Home" and other Entomological Books for Good Slides, material, &c., &c. Send particulars.—Wm. Tylar, 165, Well-street, Birmingham.

Wanted, perfect Specimens of the Fructification of Mosses (named), in exchange for Mounted Slides, *Foraminifera*, *Diatoms*, &c.; lists exchanged.—T. L. Mason, The Esplanade, Deal.

Rich cleaned gatherings of Formainifera, &c., from Turkish Sand, in exchange for Mounted Objects of interest.—H. Dashwood, 10, King-street, St. James's, S.W.

Nos. 122, 183, 201, 217, 860, 912, 1014, 1198, 1362, 1412, 1551, and others; and some rare Mosses. T. E. L. C.; list exchanged.—L. T., 19, Radcliffe's-street, Oldham.

The "Micrographical Dictionary" Wanted,—exchange or cash.—Thomas Lisle, Villiers-street, Wolverhampton.

Polished Sections Ivy-wood (10—20 years old) for ditto other British woods.—W. G. Piper, Bank Plain, Norwich.

A first-rate Photographic double dark Slide, new, for dry plates $6\frac{1}{2} \times 4\frac{3}{4}$, for mounted Micro Object-slides.—Send priced list to A. J. Adams, Blackburn, Rotherham.

Primula *elatior*, *Veronica triphyllos*, *Veronica verna*, for other local Plants.—W. Jordan, Cockfield, Sudbury, Suffolk.

Eggs of Black Kite, Bar-tailed Godwit, Whiskered Tern, Schinz's Sandpiper, Crested Grebe, and Red-legged Partridge, for equally good specimens. (Date and locality given).—C. Dixon, 60, Albert-road, Heeley, near Sheffield.

British examples of *Zonites radiatulus*, *Helix caperata*, var. *alba* (pure white variety), *Helix fusca*, and many others, for other good forms of British Conchology.—Address, Lister Peace, Hebble-terrace, Bradford-road, Huddersfield.

Wanted, a few dozen specimens of *Emarginula reticulata* or *Fissurella reticulata* for south-coast Marine Shells. Dead shells not objected to.—Miss Colson, Swanage, Dorset.

Eggs of C. Buzzard, Marsh Harrier, and others, for other good Eggs.—H. Turner, 90, Albert-road, Heeley, Sheffield.

Jointed Hair from crown of Tree Fern (*Cibotium princeps*), mounted, for exchange; also some unmounted.—E. Lovett, Holly Mount, Croydon.

Wanted, a good Microscopic Cabinet, to hold 300 or 400 slides, or good Works on Natural History, in exchange for a Carter's bronzed Reading Easel, on Castors, quite new.—G.N.W., 10, Edinburgh-place, Weston-super-Mare.

Slides of Licmophora and other Diatoms, parasitic on Sphacellaria, pure Sponge Foraminifera, Spicules Alcyonium and Sponges, Wood Sections, Hairs, Sphæraphides of Cactus, &c., all well mounted, in exchange for Geological, Injected, or other first-class Slides.—A. Durrand, 37, Cheltenham-street, Barrow-in-Furness.

BOOKS, &c., RECEIVED.

"On Fermentation." By P. Schützenberger. London: H. S. King & Co.

"Geology for Students and General Readers." By Prof. A. H. Green. London: Daldy, Isbister, & Co.

"Botanical Names for English Readers." By R. H. Alcock. London: L. Reeve & Co.

"Examination of the Arguments for and against Darwinism." By J. Maclaren. London: E. Bumpus.

"Handbook to the Geology of Derbyshire." By the Rev. J. M. Mills, F.G.S. London: Bemrose & Sons.

"The Moon and the Earth." By T. M. Reade. London: Hardwicke & Bogue, 192, Piccadilly.

"Report of Manchester Field Naturalists' Club for 1875."

"American Naturalist." March.

"Chemical News." April.

"Land and Water." April.

"Monthly Microscopical Journal." April.

"Potter's American Journal." April.

"Ben Brierley's Journal." April.

"Journal of Applied Science." April.

"Boston Journal of Chemistry." April.

&c. &c.

Communications up to 7th ult. Received from:—F. K.—J. M. M.—R. G.—E. L.—F. J. A.—H. M. J. U.—A. J. R. S.—W. W.—J. H. G.—F. J. P.—A. G. W.—H. W. H.—Col. J. G. H.—W. J. H.—H. C. C. M.—E. M. B.—E. F. G.—H. G. B. P.—C. P. H.—E. S.—W. D.—J. R. S. C.—T. Mc G.—Dr. P. Q. G.—C. B.—E. E.—A. S.—F. C.—J. B. B.—W. B.—W. K. B.—F. A. A.—H. D.—W. H.—C. W. A.—H. F.—T. G. M.—J. T. R.—F. G. E.—S. A. B.—W. P.—H. P. M.—W. T.—H. E. W.—A. W. L.—C. W.—W. C. H. B. J.—W. F.—H. E. F.—W. G. P.—E. T. N.—G. D. B.—W. G. S.—J. T. T. R.—S. S.—W. F.—H. J.—J. L. C.—J. H. M.—W. E. S. &c., &c.

THE MICROSCOPE AND MICROSCOPIC WORK.

No. VI.—By F. KITTON.

THE unsatisfactory performance of the instruments in use in the seventeenth and eighteenth centuries is evinced by the numerous forms of microscopes constantly "invented" by the opticians of the period. Fifteen years after Martin had invented his Universal Microscope, an optician of the name of Ayscough introduced another "Universal Microscope," of which a description appears in the *Universal Magazine* for April, 1753, "*Sent us by our Old Correspondent* Amico-Mathematicus." This is written in the sententious style so common in the eighteenth century. We give the following extracts from his paper:—

"The microscope has been the source of an infinite number of discoveries, and consequently given us new motives to adore and be sensible of the hand of the Creator. This instrument has by ocular demonstration confuted all those empty formations which have falsely been attributed to matter, and unveiled to our eyes the immediate operation or action of a wisdom which daily produces everything, or from one day to another unfolds what in the beginning was created in miniature, that it might again produce and perpetuate itself through all ages.

"The microscope shows us all those insects bursting from the eggs that contained them. There are at present no plants whose seed it does not discover to us. The very mushroom has its own; and the dung which may very well nourish it can no longer be supposed to generate it."

This instrument appears to have been very portable, and could be used either as a simple, or compound, or double (as they were then called) microscope: the focal adjustment appears to have been made by sliding the stage up or down.

The *Gentleman's Magazine*, vol. xxiv., 1754, contains some figures of microscopic objects, and a description of them by A. Y., accompanied by the following letter:—

Mr. Urban,—

Having observed that in the cuts which accompany your most useful Magazine, the very spaces between the larger objects are filled up with something pleasing and instructive, for a future supply of such, when they may be wanted, I have sent you a few exact representations of microscopical objects, beginning at first with the more simple ones, for even such afford no small amusement to the curious. If I find you think them worthy a place, I may perhaps furnish you with others yet more entertaining.—Yours, &c.,

Aug. 6. A. Y.

The following is a list of these "amusing and instructive objects":—1. *A few grains of Sand.* 2. *A drop of Salted Water* grown dry. 3. A drop of Water wherein hay, straw, &c., have been soaked. 4. *A drop of Vinegar*, which has been exposed to the air in mild weather. It exhibits lively animals nearly resembling little eels, and seldom any other. 5. *Nitre.* 6. *Sugar*, which the describer says forms globules. 7. A drop of Oyster liquor, kept 3 or 4 days in a drinking-glass. "We are by no means to imagine that the little eels in the vinegar or the animalcules in the infusions are the offspring of putrefaction. Experience informs us that if the vessels be close-stopped nothing will be produced. We ought, then, to conclude that when they are open, the females floating in the air come thither and deposit their eggs or spawn in a place which may favour their hatching, and supply them with food."

In the November part of the same volume these

microscopic wonders are continued, and the author gives us four figures of infusorial animalcules. One of these represents a remarkable instance of evolution, and, no doubt, if Darwin had only come across a similar instance, he would have traced man to this animalcule, rather than to a larva form of an ascidian. (See fig. 64, on page 124.)

In addition to the copy of the figure, we give the discoverer's description of it:—"But of all the objects, that represented by figure 5 is the most bizarre; it was found in an infusion of the royal anemony, in common water, kept eight days; the whole body is covered with a mark representing an human face, with six radii or claws, and a tail crowned at top with a kind of heart. Its motion was but dull, yet sufficient to show, beyond all doubt, that it was of the animalcular kind."

About this time, Mr. Henry Baker, F.R.S., F.S.A., published the result of *his* microscopie investigations. These observations were made with an instrument constructed for him by Mr. Cuff, and of which he speaks very highly. Having once possessed one of these microscopes, we can speak favourably of the mechanical part of it; the lenses were double-convex, and probably neither better nor worse than those made by other optieians years before. The subsidiary apparatus weer perhaps more numerous than usual. In the year 1747 Mr. Cuff invented an eye-piece micrometer, of which a detailed account was given by the first President (under the Royal Charter) of the Royal Society, Martin Folkes, Esq.*

"This Micrometer only consists of a Lattice of fine Silver Wire, distant from each other one-fiftieth of an inch, intersecting at right Angles and so placed in the focus of the Eye Glass as to divide the whole visible Area of the Microscope into Squares, whose Sides are each $\frac{1}{50}$ of an Inch."

The plan adopted to ascertain the true magnitude of an object was similar to that now used when the modern eye-piece micrometer is employed; instead, however, of a stage micrometer, the diagonal scale was used, and when this was not practicable, a minute object was measured under a low power, and this was again employed as a unit of measure for the higher power.

The usual number of objectives sold with the instrument was six, the following table shows their magnifying powers:—

No. 1.	189	diameters.
2.	161	,,
3.	84	,,
4.	49	,,
5.	28	,,
6.	17½	,,

* This gentleman presided eleven years at the meetings of the Society, and would have probably been elected for the twelfth time had not paralysis compelled him to decline the honour.

Mr. Baker had, he tells us, an extra lens made particularly for him, and which had the extraordinary magnifying power of 320 diameters.

Our No. 1 was so dark, as to be virtually useless; what the above glass was, it is difficult to imagine. The diameter of the lens in No. 1 was about the eighth of an inch; this was dropped into a little brass cell, with an aperture of not more than the $\frac{1}{20}$ of an inch; this was the only means then known of counteracting the chromatic and spherical aberrations of single lenses. The microscope seems to have been a popular scientific instrument in the middle and latter part of the last century, if we may judge by the demand for works relating thereto. Baker published three editions of the "Microscope made Easy," and only one year elapsed between the publication of the second and third editions. This work was also translated into French, German, and Dutch. In 1753, nine years after the publication of the third edition of the "Microscope made Easy," appeared the first edition of his "Employment for the Microscope," 8vo., pp. 466, plates 17; a second edition was published with an additional plate in 1764. In 1785 the two works just named were published, under the title "Of Microscopes, and the Discoveries made thereby." Vol. I. "The Microscope made Easy," 8vo., pp. 324, plates 15. Vol. II. "Employment for the Microscope," pp. 452, plates 15. Baker also published "An Attempt towards a Natural History of the Polype," 8vo., pp. 222, plate 1, and also illustrated with woodcuts: London, 1743. This was translated into French under the title of an "Essai sur l'Histoire naturelle du Polype Insecte, traduit de l'Anglois par P. Dumours," 8vo., pp. 359, plates 22, Paris, 1744. It seems that M. Dumours "bearbeitet" (as the Germans would say) as well as translated Baker's work. "Trembley's Mémoires pour servir à l'Histoire d'un genre de Polypes d'eau douce," did not appear until 1744.

In the "Employment for the Microscope" are given directions for the preparation of objects for the microscope. The title-page gives a good idea of the character of the work. The following is a copy of that appended to the 2nd edition:—

"EMPLOYMENT

FOR THE

MICROSCOPE.

IN TWO PARTS.

I. An Examination of *Salts* and *Saline Substances*, their amazing *Configurations* and *Crystals* as formed under the eye of the *Observer*,

WITH

Plain directions how to prepare such Substances and preserve them in constant Readiness for Inspection, whereby the *Curious* may always be fur-

nished with numberless Objects hitherto little known:

ALSO

Occasional Considerations on *Gems*, *Poisons*, the *Vegetation of Metals*, the *Resuscitation of Plants*, the *Formation of Amber*, *Corals*, and many other Subjects.

II. An Account of various ANIMALCULES never before described, and of many other *Microscopical* DISCOVERIES,

With OBSERVATIONS and REMARKS;

LIKEWISE

A Description of the Microscope used in the Experiments, and of a new *Micrometer*, serving to show the size of magnified Objects,

Together with

Instructions for printing off any *Metal* or *Coin*.

Illustrated with Seventeen COPPER PLATES.

By HENRY BAKER, Fellow of the *Royal Society*, and Member of the Society of *Antiquaries*, *London*.

Rerum Natura nusquam magis quàm in Minimis tota est.

Plin. Hist. Nat., Lib. xi. cap. 2.

London:—

Printed for R. DODSLEY, at *Tully's Head* in *Pall Mall*, and sold by M. COOPER, in *Pater noster Row*, and J. CUFF, Optician, in FLEET-STREET, 1753."

"The author says that he spent ten years in making "Experiments on a great variety of saline Bodies Mineral, Vegetable, and Animal, as well as many other Substances" (one would like to know what those other substances were) "both simple and compound, whose parts can be dissolved in Fluids, after a method which has never hitherto been described by any Author, or practised before myself by anybody that I have heard of."

"That particular Notice wherewith the ROYAL SOCIETY was pleased to honour these Experiments, encouraged me to prosecute them with all the Care in my Power, to minute down every remarkable Circumstance in the Process, and to make faithful Drawings of each Configuration." In a note appended to this paragraph we are informed that "After many repeated Examinations of Salts and Saline Substances by the Help of Glasses, in the winter of the year 1743 I had the Honour twice of entertaining the ROYAL SOCIETY with a view of their Configurations, which were then thought so extraordinary, that very many of that illustrious Body came often afterwards to see them more at Leisure at my Lodgings, and in the Year 1744, Sir HANS SLOANE, Bart., late President of that Society, was pleased at the recommendation of his worthy Successor MARTIN FOLKES, Esq., and of the Council of the said Society, to bestow on me the Medal of Gold, annually presented (as the Donation of Sir GODFREY COPLEY, Bart., of which Sir HANS is the only surviving Trustee), to whomsoever of their Members shall be deemed to have produced the most extraordinary Discovery during the whole Year."

In the second chapter, he describes his method of preparing the various saline solutions for his experiments with a minuteness almost ludicrous; these solutions, he says, must be made with river or rain water, and that the water should be saturated with the salt, so as always to be certain of producing the same result:—"The Solution being thus prepared, a drop of it is to be taken up with a goose quill cut in fashion of a Scoop, and placed on a flat Slip of Glass of about ⅔ of an inch in width, and between 3 and 4 inches long. The slide is to be warmed and placed on the stage of the microscope, and the crystalization watched as evaporation proceeds."

Chapter III. deserves quoting *in extenso*, as it shows the amount of chemical knowledge possessed by a Gold Medallist of the Royal Society in 1743:—

"It seems necessary, in order to make the Matter in Hand understood the better, that some Account should be given of what is meant by *Salts* and *Saline Substances*, with some short Explanation of the Dissolution of such Substances, and their Crystalization afterwards, whereby the Difference between my Experiments and those of others may become more evident.

"Few will, I presume, imagine that I mean by Salts such substances only as afford what is called a Salt Taste, for Salts are of all Tastes, and Sugar itself is no other than a Salt extracted from the Sugar Cane. But we understand by Salts all Substances whatsoever that are dissolvable in Water, or whose Parts become so separated thereby as to disappear therein, which notwithstanding the Water being evaporated, shew themselves again combined in some sort of angular Forms, with a Degree of Transparency, and to the Taste are more or less pungent.

"To this may be added that they are fusible by Fire.

"Salt, thus understood, is one of the first Principles of the Chemists, and indeed has good Reason to be esteemed so, as it enters into the Composition of all Bodies. It is everywhere and in everything, for if any Stone, Plant, or Animal be burnt a Salt remains in the Ashes, which may be extracted by Water and separated from the Caput Mortuum.

"It is the nutriment of Animals, Vegetables, and Minerals, insomuch that Herbs, Roots, Bread, &c., deprived of their Salts can neither sustain, nourish, or increase the Bodies of Animals, and the Earth, when divested of it, becomes absolutely barren.

"Vegetables and Animals, whilst flourishing and alive, discharge, by Perspiration and other more sensible Evacuations the Excess and Recrements only of the Salts whereby they are preserved; but

when they perish the Chain whereby the Parts are kept together becomes broken, the Salts regain their Liberty by Putrefaction, some fly away into the Air, and the rest remain in a condition to enrich and render fertile that lean and hungry Earth which is destitute of such Salt.

"Tastes, Smells, and most other Effects of Bodies on one another, seem occasioned by the Action of Salts, which, by striking on our Organs, produce Sensations correspondent to their figures, and by the same means affect all other Bodies.

"Being transparent, and having a strong attractive Power, they probably supply both Matter, Consistence, and Form to Spars, Crystals, Diamonds, and all other pellucid angularly-figured Fossils. When combined and at Rest, they are perhaps the Basis of Cohesion and Solidity in most Bodies, the

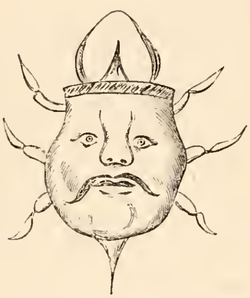

Fig. 64. Infusorial Animalcule as described in 1754. (See p. 122.)

Pegs and Nails that hold the Parts of other Matter together; but when put in Motion by the Separation of their component Particles, and their repulsive Force (which is no less vigorous than their attractive Power) becomes exerted, they are the most active Principles in Nature, like Knives or Launcets, cut their Way through everything, and produce the most surprizing Changes.

"Whence the Chemists say that in the Sun and in Salt are all Nature's Productions, and that he who knows not Salts will never perform anything in Art.

"The Distinction of Salts into acid and alkaline, into volatile, fixt, and essential, I shall leave the Reader to consult chemical writers about."

After this dissertation on salts, he gives minute instructions for making a cabinet and preparing solutions of various salts; he also recommends experimenting with mixtures of the various salts, by which means new and wonderful configurations may be discovered. Mr. Baker asserts the probability of the existence of a "Universal, volatile, acid Spirit, and it is produced by the continual Perspiration of growing Vegetables, the Putrefaction and Dissolution of those that perish over the Face of the whole Earth, all of which abound with volatile acid Salts, these, combined with Vapours from Seas, Lakes, Rivers, and other Waters, the Steams and Vapours from Metals and other Substances, all these compose together the volatile acid Spirit wherewith the Air is filled, and which probably is the active Principle that gives the Figure and supplies Part of the Matter to Crystals, Snow, and Nitre."

The following is the list of salts figured:—"Sal Gemma, or Rock Salt, Sea Salt, Spring ditto, Niter or Salt Peter, Bleu Vitriol, White ditto, Green ditto, Verdigrease distilled, Alum, Borax, Salt Ammoniac, Salt of Lead, Salt of Tin, Ens Veneris."

As the author was much struck with the beauty of the last-named crystals, we quote his remarks:—"Ens Veneris is a Sublimation of Green Vitriol with *Sal Ammoniac*, and therefore might be called Ens Martis with better Reason. It must, however, be acknowledged that blue Vitriol was employed formerly instead of Salt of Steel, and *that*, being impregnated with Copper, rendered the Name less improper: but the *Ens Veneris* our Shops afford at present has nothing of Copper in it.

"It dissolves readily in Water, and gives to a Solution sated with it a Colour resembling that of Mountain Wine, which Colour its Crystals likewise retaining, appear like the most beautiful *Chrysolites* or *Topazes*, seemingly cut with the greatest elegance. . . . . . . But the Singularity of this preparation is, that in some part or other of the drop, you will seldom fail to find a very regular and well-fashioned two-edged Sword of Crystal."

Flowers of Antimony, Salt of Amber, Scarborough Salt, Cheltenham ditto, Epsom ditto, Glauber ditto, Sal Polychrestum.

The above list is sufficient to show the kind of salts he experimented with, and it will, therefore, be unnecessary to give the names of all the salts examined. Some of them it is difficult to understand how they were prepared, as, for example, *Salt of Coral*, *Salt of Fennel*, *Salt of Thistle*, and salts of various other plants.

Chapter LIII. part I., describes his investigations "Concerning the Vegetation of METALS." He gives very minute directions for the preparation of ARBOR DIANÆ, *or the Silver Tree*, ARBOR MARTIS, or the Iron Tree, and ARBOR VENERIS, *or the Copper Tree*.

The following is his formula (or, rather, Monsieur Hernberg's, whom he quotes):—"Make four Drams of fine Silver into an Amalgama without heat, with two Drams of Quicksilver. Dissolve this Amalgama in four ounces of *Aqua Fortis*, pour the Solution into 12 *Paris* Pints (about three Gallons) of common Water. Stir it well together and keep it in a Glass Vessel well stop'd. To about an Ounce of this Water in a small Phial put the Quantity of a small Pea of the Common Amalgama of Gold or Silver, which should be as soft as Butter. Let the Phial

stand a few minutes, and you will see small Threads or Filaments rising perpendicularly from the little Bulb of Amalgama, and thrusting out from their Sides little *Branches* in the form of a Tree."

The "*Iron Tree*" can be made thus:—"Dissolve Iron Filings in Spirit of Nitre, pour on Oil of Tartar per *deliquium*, and a sort of Branches will be formed and adhere to the Surface of the glass representing Leaves and Flowers."

The Arbor Veneris is supposed to be an entirely new discovery, and the author affirms, from his own experience, that it "is extremely wonderful and pretty, and made with little Trouble.

"In half an Ounce of *Aqua Fortis* let a bright Half-penny, or some small piece of pure clean Copper remain for about twelve Hours, and then take it out. Dissolve a little *Quicksilver* in as small a Quantity as you can of the same, or stronger *Aqua Fortis*. The Solution will be white and like Flour and Water, at which Instant it must be put into the first Liquor, which will immediately become of a lovely blue, and throw down something of a white Sediment, but have very little Body or Consistence. Have ready some *Salt Ammoniac* finely powdered, whereof put in a very little at a time, stirring it about until it dissolves, makes the mixture of a blueish white, and gives it a Consistence of Starch, which condition shews it to be fit for your Purpose."

A drop of this is to be placed on a piece of glass, upon which a small piece of bright iron wire has been previously laid, and in the course of a short time "Ramifications of the purest Copper" will take place. The only source of failure appears to be the quality of the aquafortis.

Another plan "was discovered accidentally by the very ingenious Mrs. Colembine, of the City of *Norwich*, in her search after new Colours from Copper for painting in Miniature. The *Scarlet Dyers* use in their Business *Aqua Fortis* saturated with Tin, and make no secret of it; but one of the trade, who is thought to excel in the richness of his Scarlet, prepares his *Aqua Fortis* after a manner known only to himself. In some of this Mrs. *Colembine* dissolved Copper, and happening to leave a Piece of Iron in the mixture, she was surprised with the Branchings from it, and shewed them to my very ingenious Friend and Correspondent Mr. William Arderon, F.R.S., who, by her Desire, sent an Account thereof to me."

The first part concludes with a notice "that those who wish to keep the *Solutions of Salts* in Readiness for Examination can be supplied with boxes, Phials, and Slips of glass by Mr. Cuff, Optician, against *Serjeants Inn Gate* in *Fleet-Street*. This may be an Ease to them, and 'tis hoped will prove of some Advantage to him."

(*To be continued.*)

FERTILIZATION IN CYPRIPEDIUM.

(*Lady's Slipper.*)

THE genus Cypripedium, according to the arrangement of Lindley, constitutes the seventh and last tribe of Orchidaceæ—viz. Cypripedia; also thus arranged in Hooker's translation from the French of Le Maout and Decainée, in which the tribe includes two other genera beside Cypripedium; viz. Uropedium and Selenipedium. The characteristics of the tribe, as described in the latter book, are thus:—"Anthers 2, lateral, both fertile, the intermediate one petaloid; pollen granular, softening during fertilization; stigma divided into 3 areolæ, opposite to the stamens." We at once perceive, by placing this tribe by the side of the other tribes of Orchidaceæ, that there is a great difference in some of the characters.

Having then just glanced at the general characters of the tribe, we will examine the individual parts of the flower more closely, and try and make ourselves acquainted with its structure, noticing as we proceed the difference between them and the analogous parts of the flowers of other orchids.

The perianth is superior and petaloid, composed of two rows, the outer consisting of two parts (sepals), one very large at the top, the other much smaller below; the large one is really two which have become united, as three is the normal type in the outer row of the perianth in orchids; the inner row contains three divisions (petals); the two lateral ones alternate with the sepals; the lower one, termed the lip or labellum, is opposite the lower sepal. The labellum is large and slipper-shaped,—hence the common name "Lady's Slipper," with three openings into the large cavity. One, the largest, in the front, separated from the two lateral ones by the inflexed edges of the labellum pressing against the column; these two lateral passages are much smaller than the front one. The labellum is without a nectar-sac or tube, so differing from most orchids; but there are slender hairs inside, lining especially the basal part, bedewed with little shining drops of liquid, apparently like nectar, but in which Mr. Darwin could find no trace of crystallization when dried. This is so much like nectar that it would easily attract insects. The central body, termed the column or gymnostegium, is rather short and is not terminated by the anther as in other orchids, but the anther is supplemented by a large shield-like body, slightly notched at the top, and with a larger notch at the bottom, dividing it into two ear-like appendages. This is very prominent, standing in front of the lateral passages, and partly over the stigma. Anthers two, one on each side of the style, behind the shield-like body, and midway in the space occupied by the lateral passages. Pollen granular, covered with a viscid substance which is so sticky that it will pull into threads.

There is a great difference between this pollen and the pollen of other orchids, in its not being bound together into masses. The anthers belong to an inner row, and approach the third row in other monocotyledonous flowers. Rostellum absent. Stigmas three, two confluent, rounded on the stigmatic surface which faces the basal part of the labellum, presenting the dorsal part to the anthers immediately above: thus the whole (or nearly so) part of the stigma capable of being fertilized is turned directly from the fertilizing agent. The stigma of other orchids is waxy or glutinous, but in this case it is simply moistened and roughened, resembling a rasp on a very fine scale. We can easily perceive then that the stigma cannot be fertilized without some foreign agency. Supposing the pollen to fall, it would only lie on the dorsal surface of the stigma and there perish; but as far as we have observed,—and that has been a good many observations, the pollen does not move of itself, but remains in its place and perishes with the flower.

We have drawn the description out longer than we intended, but perhaps we shall now more easily understand the method of fertilization.

Mr. Darwin (whose name is so well known in connection with this subject, and whose wonderful investigations have opened our eyes to many important facts) thought that the fertilization might be effected by the agency of some insect inserting its proboscis into one of the lateral passages, and in the act detaching some or all of the pollen, and in sending its proboscis farther down might bring the pollen against the rounded edge of the stigma; or if it went to the front of the flower or another flower, it might be more easily accomplished by the entrance to the stigma through the notch in the shield-like body. This process Mr. Darwin accomplished with a bristle, and, as he (Mr. Darwin) suggested, it could be done much more efficiently by an insect. But if it is possible, we think there is a more exquisite and simple method than that for securing either self or cross-fertilization. This method was, we believe, first predicted by Dr. Gray, and has in many instances since been confirmed.

It is brought about by the agency of flies or suchlike insects, which are attracted by the apparently enticing nectar mentioned above. We will then suppose a fly to alight on the labellum, and, catching sight of the bedewed hairs, to at once descend into the labellum by the front entrance, for the purpose of obtaining a free luncheon. Whether it finds anything satisfactory or not we cannot say; but, owing to the curious arrangement, the return may not be so easy, and the hairs being especially bedewed towards the hinder part of the labellum, and daylight coming in through the two lateral passages, urges the fly to push its way forward under the stigma which forms the roof of the passage, to escape by either of the lateral passages. Thus, sealing the side of the labellum, the back of its head comes directly in contact with the anther, and easily detaches the whole or part of the pollen, which remains fastened to its head, and away it flies to another flower (can we imagine the fly would enter the same flower again?), entering the same way; but in passing the stigma this time, the pollen comes in contact with its roughened surface, and part or all of it is left; thus securing fertilization, unconscious no doubt of the great good done to Cypripedium; the fly passes out again only to get another dose of pollen to convey to the stigma of some other flower; and so on. And we can easily imagine how self-fertilization may be effected by the insect entering either of the lateral passages and carrying the pollen in that way to the stigma. This exquisite method can be very easily performed by any who may have the opportunity of doing so, by detaching the pollen with a finely-sharped pencil and passing the pencil under the stigma by the front entrance, leaving the pollen on the stigma. Can there be a more simple and efficient arrangement imagined?

J. T. Riches.

AFTER CORMORANTS.

(*Phalacrocorax graculus*, or *cristatus*.)

THE gentle readers will, I hope, understand that neither I, nor the young friends whom I am about to introduce to them, are professed fowlers; far from it: we consider it a sin to take away the life of one of the feathered tribe unnecessarily, contenting ourselves commonly with levelling at them our binocular. If we occasionally commit the petty larceny of abstracting an egg or two from the lot in a nest, it is in the cause of science; or if we have incited our lithe young friends to scale the rocks after cormorants and herons, it has only been in order to enrich the Loamshire Museum. This must be our excuse—at least mine—on the present occasion. All young men, like my friends P., C., and A., are either fowlers, fishers, or huntsmen by nature, and are not commonly put upon their defence for such matters; that is if they do not break the law.

There are two islands called Mona in the Irish Sea, and on the north-east shore of one of them is a bold promontory stretching out into the sea and forming the southern shore of a bay, on which is situated a little town, backed somewhat to the left by a fine dome-shaped hill, or rather mountain. Pleasant is the scene when you approach by sea, on a summer evening,—the sun about to set behind the high ground. The promontory is then a beautiful object, corn fields at the top, then a mixture of rocks and of bright verdure, and below picturesque and pillared rocks or stacks; those situated on the south

side of the headland being the scene of the following narrative:—

Since you ask me for it, I send you an account of our expedition after Cormorants. There were three of us. We decided to go on Thursday, January 14, which proved a bright frosty moonlight night, with a slight inshore wind: the moon rose about 8 p.m., and at that hour we started.

We knew the rocks well, and took the most direct course to a spot immediately above where the birds roosted. Here we sat down and made our arrangements. We had brought a long stick, somewhat stronger than a fishing-rod, and to the end of this we fastened an ordinary noose of fine brass wire. I had brought a lantern also, that we might examine any caves and holes in the rocks, into which the light from the moon could not penetrate. As it turned out, this lantern proved very troublesome and of no use whatever; indeed, I wished more than once that I had left it at home. When all was ready, we crept cautiously to the edge of the rocks and looked over. At first we could see nothing. Presently, however, A. made a sign and took hold of his stick: slowly he let it down; then a sudden jerk and an old cormorant dropped silently off his ledge and lazily flew away, looking like an evil spirit, as his dusky form crossed the bright moonlight track on the water—then vanished. We were disappointed, but spoke not a word as we silently picked up our sticks and quickly and quietly crept away.

We soon came to our next station. A., staff in hand, leant over the rocks, keeping tight hold of C. I held C. securely by his other hand, clutched a bunch of heather that was growing just above me, and planted my feet firmly in the soft ground. Slowly again the rod descended, then a piece of the rock appeared to peel off as a dark form dropped down and disappeared into the darkness beyond; this was followed by another; then another, and yet another. The stick was drawn up, and A. explained in a hurried whisper that he could not see the end of it. We tore a strip off a white handkerchief and bound up the under part of the noose; then he began again, for so silently had the others departed that the bird he was trying for still slept undisturbed. The rod was now lowered for the third time; I clutched C., he tightened his grip on A., and there we lay, stretched on the grass, scarce daring to breathe, with the stars overhead blinking in astonishment, and the pale moon staring with all her might, wondering, no doubt, what mad pranks we were after in such a strange place at such a strange time. Suddenly a dab—another, and a wild swoop in the air after the escaping cormorant. Evidently this noose dodge wouldn't answer. As the bird slept with its head tucked under its wing, there was nothing to slip the noose round—besides, the knot wouldn't slip!

We got up now and moved to another spot. We scrambled down to a ledge of rock, and crawled along the slippery grass, peering cautiously over the edge every now and again. At length we caught sight of a bird on a narrow ledge immediately below us. We stopped a moment. I wedged myself into a hole, feeling, like an old hermit crab, with my hands for claws, gripping C. by his left wrist, as he with his right hand gripped his brother. Then A., in stocking feet, let himself down, and crept cautiously towards the sleeping cormorants. As he stooped low down, we had all to stretch our utmost, and I nearly burst out laughing to think of C.'s uncomfortable position in the middle, with A.'s full weight on one side, and mine to serve as balance on the other. At that moment, however, A. made a sudden grab on the bird nearest him. Then was heard a heavy flapping motion, as two dark objects dropped out of the shadow, crossed the silvery track of the moon, and disappeared again into deeper shadows beyond; but there was more flapping of wings to less purpose, as a third was held up by its long neck, for A. had succeeded at last. We got it up, and took care in the first place to secure its beak by twisting some brass wire round it. Then C. made a hole in the lining of his jacket, and we stuffed the beast in head first. It gave an unearthly croak, which made us laugh.

We sat down now to rest, and A. put on his boots again.

The descent had not been easy as that of Avernus, but to regain the top of the rocks certainly was a toil and a labour. However, we got up somehow, and moved to another spot, taking with us the stick, which, however, we didn't intend to use, as it didn't seem to answer our purpose.

We came at last to a place where the grass grew to within 12 or 15 feet of high water-mark. Here we went down, and leaving our boots, the lantern, and the stick, carefully scrambled over the rocks for some distance. Presently we came to a square table of rock, over which we peeped, and saw shining in the cold light of the moon the glossy black feathers of a dozen or more cormorants. There they squatted on bits of ledges, not crowding one another, but sitting two or three on a ledge, some with their heads buried beneath their wings, some with outstretched necks swaying slowly to and fro, their little emerald eyes sparkling in the light of the moon, and the white streak on their beaks looking like "a mocking grin." They might have been spirits of departed sinners brooding over their lost opportunities of doing ill. They made one think of Satan, when he

> "——— on the tree of life
> Sat like a Cormorant—devising death
> To them that lived."

Do cormorants perch on trees? If so, how can they hold on, having no hind toe?

While I had been dreamily contemplating their

fiendish appearance, A. had been looking out for a good means of approach, and was now making anxious signs for us to follow him. We formed our chain once more, and were again successful. The *modus operandi* was simply this:—A. would get as close as possible to the sleeping bird, and stretching his hand cautiously over it, would seize it by the neck, the nearer the head the better, to prevent its turning and biting. This was a much finer bird than the other, and had a crest which at the time we thought was merely the feathers that had been disturbed. We had some difficulty in getting the wire

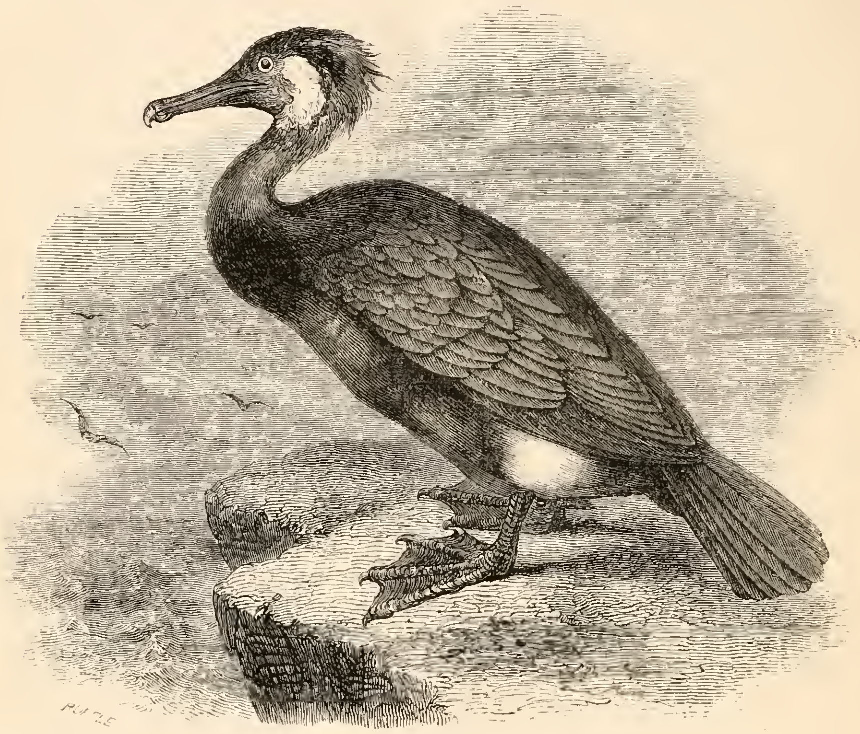

Fig. 65. Common Cormorant (*Phalacrocorax carbo*).

round its bill, and C. got severely bitten in the attempt. We hastened back now to the grass and put on our boots, first securing our last catch, by wrapping him up in a handkerchief, and tying his legs; we then laid him on his back in a hole in the rocks and sat around. We stirred up the other, which was a hen, to see if she were comfortable, and whether she could breathe with her beak fastened, and wrapped as she was in a coat. She gave a strange guttural croaking when disturbed, which might mean anything. We took it to mean that she was comfortable and only wished to be left alone. We laughed and squatted down to enjoy reflection.

* * * * *

Our bird having got its wings free, attempted to escape, but we did not intend to let him off so easily, so bound him up again, and tucking him under my arm we turned our faces homewards, well pleased with our success.

We put them in an old meat-safe for the night, and left them, hoarsely expostulating.

Next morning they were croaking loudly. We had some difficulty in taking them out of their cage without hurt to ourselves, as we had taken the wire off their beaks, and they snapped most savagely with hideous croaks.

We did get them out, however, and let them run on the lawn with a string to one leg. They did not attempt to fly,—I suppose they could not get started off the level plane,—they seemed not a bit afraid, though they had numerous spectators around. I tried to feed them with raw meat, but had to stuff it down their throats; getting a bite for my pains. They did not swallow it, but seemed to put it in a little bag beneath their bills, which I had not observed before; when this was full, they threw it all up again. I gave them a bath, but had to put them in, and they got out at once; perhaps the tub was too shallow for them to dive in; then placing them close together, side by side, we upset the tub of water clean over them; but, even that did not seem to please them; so, letting them first get

dry in the sun, we wrapped them up each in a towel, bound their beaks, and carried them off. The cock we gave to a friend who was anxious to tame it: he managed to feed it on fish and raw meat, and kept it for a week. Unfortunately, a dog got hold of it one day and so hurt it that the poor beast died, for which we were all very sorry. I believe they are easily tamed, but they eat such a lot—twice their own weight in a day—and they smell so strong that they do not make the pleasante of pets.

The hen we took down to the rocks; we fastened one end of a long fishing-line to her leg. We wanted her to catch us some fish; but she did not seem to understand; at all events she would not catch any; finally, we let her go. She knew directly that she was free, and took a long dive, swimming straight out to sea. We soon lost sight of her, and no doubt she found her way back to her old roosting-place, "a sadder but a wiser" bird.

* * * * *

These birds were not the common Cormorant, but the Green Cormorant or Crested Shag (*Phalacrocorax graculus* or *P. cristatus*), a smaller bird, but easily distinguishable by that and its prevailing green colour. My friends called them *scarts*, which I suppose is the Scotch name. We measured them, and found them to be from the tip of the beak to the extremity of the tail, 2 ft. 4 in., and across the wings from tip to tip, 3 ft. 6 in.; they weighed about 4 lb.

The bill was hooked at the point of the upper mandible; the nostrils were slits, running up the beak. When feeding them, I observed a bare place under the lower mandible, which seemed to hold the food, but which was not noticeable except when full. The tail, comprised of twelve feathers, was long and very stiff; in both birds the feathers had the appearance of having been worn round, as though they used their tails for props when sitting; perhaps, also, they make use of them in climbing the rocks. The legs, placed well back, were short and strong; the feet webbed; the four toes united by a single membrane; the claw of the middle toe serrated, like that of the Heron, apparently in order that it may be used in trimming the plumage. The cock was a glossy green, the wings being beautifully mottled with brown. The feathers on their backs had the appearance of fine hair, very close. There was no white about them, except the curious line on their beaks. Their eyes were like emeralds, and when they were angry there were red rings round them, which made them look very fine. Their legs and feet were dark, those of the cock being almost black. The hen was browner and coarser-looking han the cock. The cock had a fine crest. As this was in January, it is evidently a mistake to suppose they are crested *only* in the breeding season.

Feb. 22nd.—Again to the rocks, but it was too fine a night; the water that trickled down there was frozen, and the frost was so hard that we could not pass through the grass without making a rustling noise; another drawback lay in the tide being low, the birds being on the low, barnacled rocks, we could not get at them by land. They seemed wide awake, as we could hear them fighting and diving into the water, which was like a sheet of glass, reflecting myriads of stars. Is it about their breeding time, that they were so restless? When we found the shags "no go," we went after the herons, and seeing one asleep, we got to within a couple of yards of it, when some absurd instinct caused it to untuck its head, though it could not have heard us; it must have wakened up by the merest *fluke*. Of course it was gone in a moment; but to our astonishment it was followed by five others, which we had not seen. One was a magnificent cock, and A. shot it the following morning, and the stuffer said it was the finest specimen he had ever seen. They are up the river now.

March 10th.—We were out again last Saturday, and caught one of the large cormorants (*P. carbo*). It had an abominally strong smell, far worse than the little green ones, and its plumage was not so handsome; the feathers on its back were blue on the face of them, brown underneath, and a sort of dirty white where they reached the skin; I mean the hair-like covering of its back and breast. It was fully twice the size of the green shag.

14th.—We found the ravens had built their nest, and lined it with wool. They were flying about all the time we were there, perching now and then on an edge of rock, not many yards from us. We have been watching the falcons (peregrine) lately, and can form a good idea where they are likely to build; one place we could easily get at. There are but two pairs of ravens about here, one at the Head, and the other at the D—; and a pair of peregrines at each place.

April 6th.—A. visited our ravens about a week ago, and took one egg (there were three, and we expected that one would be laid afterwards). I went there a few days ago and there was a stone in the nest, a piece of rock which had peeled off from above, and partly crushed one of the eggs The ravens have built again, and are now sitting. A. lays traps baited with egg-shells to catch a red-legged crow, but they have declined to be caught, so far; though we have the chance of a "Grip" like Barnaby Rudge's, which loved to cry "No Popery."

[Since the last addendum was penned (on Good Friday), one of the young men who took part in the hunt "After Cormorants," Mr. Alfred Rudd, lost his life whilst seeking for birds' nests in company with the writer of the present article. The latter gentleman had fallen from a height of 120 feet into the water, and is still lying ill from the effects.

Mr. Rudd had gone for assistance, and seems to have fallen down a cliff 150 feet high, at the foot of which he was picked up dead. Doubtless our readers saw a notice of this sad event in the public papers.—Ed. *S.-G.*]

THE ORIGIN OF THE PLANT NAMES OF THE WARREN.

THE following paper was read a short time ago by the Rev. J. G. Mills, M.A., before the Folkstone Natural History Society.

The preparation of this subject does not require that one should be skilled in the science of Botany. It would have been presumption on my part, after the brief attention which I have given to its study, to have attempted to deal with that which requires long and patient research and labour. I have confined myself to the study of words, in the hope of being able to show that beyond their minute structure, growth, and organization, flowers possess an interest even in their names, and thus give additional charm to our botanical studies. The scientific study of Botany becomes then blended with other subjects, such as Philology, History, and Heathen Mythology; for when the eye is watering with its long-continued investigation of the component parts of the plant, and the patience has been sorely tried by the perversity and obstinacy of those parts which refuse to be separated exactly as we wish, a pleasant interval might be spent in meditating on the history or legend connected with the flower; after which one might return in a better and a calmer frame of mind to a renewed scientific investigation. Of course it will be understood that we do not touch upon "The Language of Flowers."

Plants have been variously named—some from the country or locality in which they grow; as the Arabis (Rock Cress) from Arabia, the native country of various species; Iberis (Candy Tuft) from Iberia (Spain), where many species grow; Tamarisk, from the river Tamaris in Spain, upon the banks of which it grows in profusion;—others after the name of the discoverer of the plant; as, Roemeria, after Roemer, a German botanist; Matthiola (Stock), after Matthiolas, an Italian physician; Teesdalia, after Robert Teesdale, a Yorkshire botanist; and Lobelia, after Mathias Lobel, a Flemish botanist;—others are named from their appearance, as Galanthus (snowdrop), the milk-flower; Chrysanthemum, from the golden flowers; Stellaria and Aster, from the star-like flowers; and Trifolium, because of the three leaflets;—others are named on account of some property which they possess, whether beneficial or destructive; as Tussilago, from its use as a cough medicine; and Althæa, from its healing, and Deadly Nightshade from its poisonous properties;—others are named on account of their historial association, as the Fleur-de-lis; and others on account of their mythical association, as Daphne, Adonis, and Dianthus.

I will ask you now to pay several visits with me in fancy at different periods of the year, to the happy hunting-ground of the Folkstone botanist, the Warren, and there to make collections of flowers. Those flowers which I have already mentioned are not all Warren flora. They have been used by me simply to illustrate the various modes of nomenclature, and by their non-appearance, with the exception of the Fleur-de-lis, in the remaining part of the paper, useless repetition will be avoided. I have divided the etymology into two parts, *Historical* and *Legendary*. Under the title "History of the Names," I shall include those names which represent the country or locality, the discoverer's name, appearance, properties, and historical associations; and under the title, "Legends of Names," those names which are connected with heathen mythology. Whether this be a correct division or not will perhaps be decided in the discussion which will follow.

Let us then first take the order Ranunculaceæ. This order is named from the Ranunculus, one of the very large family belonging to this order. Derived from a Latin word *ranunculus*, a diminutive of *rana*, a frog, this order is that of the little frogs. The name was given to the Ranunculus because it grew in marshy places, the habitation of the frog; but this distinction is not enjoyed by the Ranunculus alone; for Cicero, in his "Epistolæ ad Familiares," humorously calls the inhabitants of Ulubræ, who lived in the vicinity of the Pontine Marshes, Ranunculi, or the little frogs. He says:—"Ex qua jam audieram fremitum clientium meorum, quos quidem tu mihi conciliasti. Nam Ulubris honoris mei causa vim maximam ranunculorum se commosse constabat.—From which (villa) had I now heard the shouting of my clients, whom indeed thou hast won over to me. For at Ulubræ, for the sake of my honour, it was clear that they had stirred up the greatest force or power of the little frogs." Dr. Ogilvie (editor of the Imperial and Comprehensive Dictionaries) derives the word from *rana*, a frog, and *ungula*, a claw, from *unguis*, a nail; and gives as its meaning, Frog's Foot or Crowfoot, a plant and flower. Dr. Prior says it is called crowfoot from being supposed, from the shape of its leaf, to be the coronopus or crowfoot of Dioscorides, who was physician to Antony and Cleopotra, and who wrote a book upon medicinal herbs. Clematis is a Greek name, and is derived from the word *klema*, a vine twig. It is named because of its twining leaf-stalks. One common name of Clematis Vitalba, Traveller's Joy, is very appropriate. It was given by Gerarde, from "its decking and adorning waies and hedges where people travel." It

possesses, however, many other common names, being known as Virgin's Bower, Lady's Bower, Old Man's Beard, Hedge Vine, and others. With regard to the name Virgin's Bower there is some difference of opinion. For instance, in HARDWICKE'S SCIENCE-GOSSIP of February, 1869, a writer says, "Virgin's Bower undoubtedly refers to the Blessed Virgin, and points to the Assumption," whilst Dr. Prior, in his "Popular Names of British Plants," says: "So named by Gerarde, as fitting to be a bower for maidens, and with allusion perhaps to Queen Elizabeth, but not, as we might be tempted to imagine, to the Virgin Mary in a resting scene on the way to Egypt, the frequent subject of pictures." I am inclined to agree with the writer of the article, because the plant is also called Lady's Bower, and this name, Dr. Prior himself admits, refers to the Blessed Virgin. The plant is called Old Man's Beard, from its long feathery awns, and Smoke Wood, from boys smoking its porous stalks. The other names, Bind-with, Hedge Vine, &c., are self-interpreting.

The Papaveraceæ are so called from the Latin word *papaver*, a poppy. *Papaver rhœas*, the common Red Poppy, is named from the Greek verb *rheo*, to flow or fall, on account of the speedy falling off of the petals. *Papaver somniferum* (White Poppy) is the sleep-bearing or sleep-producing poppy, so called from its narcotic properties. Another of the Papaveraceæ is Glaucium, of which *Glaucium luteum* (the Yellow-horned Poppy), grows in the Warren. The word *glaukion*, according to Liddell and Scott, who quote from Dioscorides, meant the juice of a plant, like the Horned Poppy. It is derived from *glaukos*, meaning pale blue or grey. Dr. Hooker, in his "Student's Flora of the British Islands," says that the plant was named Glaucium (blue) from the hue of the plants, the flowers of which are purple or yellow; whilst Miss Pratt says that it is so named from the glaucous or sea-green hue of its foliage. I should be inclined to think that the etymology given by Dr. Hooker is the correct one.

(*To be continued.*)

THE FLYING SQUIRREL.

(*Pteromys volucella.*)

WHEN the last rays of the departing sun gild the leafy tree-tops, or later, it may be, when Night lets her sable curtain down, and pins it with a star, out from some hidden hollow in the trees there comes with a joyous bound our merry-hearted pet, and reaching the outermost branch of his home-tree, he literally spreads his wings, and sails through the quiet air until another tree is reached, and so, on and on, through the depths of the forest.

But not alone is he, when thus on his nightly travels; another and another of his kin come from the same retreat, and young and old traverse in like manner some well-known path, seeking while absent for their daily food, and then, often late in the night, coming back by the same route, chattering like school-girls, as they dart, with marvellous celerity, from bough to bough.

But they do not now retire for the remainder of the night; far from it, for the little tramp they have had seems only to have stretched their limbs; and now, their frolicking among the upper branches of the trees is really indescribable. It would be hard enough to give the details of their movements, if plainly seen in broad day. Such a chance seldom or never happens, and my own knowledge of what they can do is derived solely from glimpses of them during moonlight nights.

When disturbed during the day, they are as stupid as owls, for a little while; when, realizing the situation, off they scamper, with an awkward gait, if on the ground; but using their "wings" to good advantage, if in a tree among trees. From observations made in this way, I have satisfied myself that this "flight power" of the Squirrel enables it to preserve a horizontal position for several feet, before the downward glide commences; but the membrane once expanded, is not moved, I think, until the animal draws in its feet, to seize the branch it has reached. A word more concerning this habit of flying. I have twice met with individuals of this species that were apparently reversions to the ancestral non-flying squirrel. The membrane extending from the fore limbs to the hind limbs, that acts as "wings," was not developed, and the fore limbs were somewhat stouter than in the normal condition. In their movements, these squirrels were more like the true *Sciuridæ*; but, being associated with their own kind, they tried to fly, and, in reality, executed a very graceful dive. These two non-flying squirrels were both adults when captured, and died in a few days after being caged.

Years of familiar acquaintance with these squirrels has not enabled me to detect much in their habits indicative of intelligence, and it is for this principally that I look in studying animal life. I feel sorry to have so poor an account to give of these beautiful animals, but I am compelled to say it of them—they are not "smart." Notwithstanding all their vivacity, when in their native haunts, or in cages, they do not exhibit by their movements, so far as I could ever detect, any trace of sociality; but each, on the contrary, jumps, runs, flies, and spreads himself in the air, holding to some small twig by his hind feet, solely on his own account, quite irrespective of the movements of his fellows, and apparently unconscious of their proximity. Their utterances, too, are quite as frequent when they are alone as when associated with their own kind; thus robbing these of

every trace of similarity to true language, which the ordinary cries and calls of many mammals and all birds, I believe, really are. On the other hand, as already stated, the family keep together for a year, which seems to contradict the preceding remarks; but it must be borne in mind, that as these animals are nocturnal in their habits, it is very difficult to accurately and unquestionably determine what precisely is the routine of their daily life. I have long noticed, however, that while associated they act wholly independently, and when a pair is caged, the survivor shows no indication of sorrow at the death of his mate. The very opposite of all this is the case with both the common chipmuck (*see* SCIENCE-GOSSIP for February, 1875) and our grey squirrel, and I am told, also with the little red squirrel (*Sciurus hudsonius*).

When the night is well-nigh gone, these tireless flying squirrels cease their incessant exercisings, as their movements seem to have been, and seeking their nest, one by one they disappear, and roll themselves into balls at the bottom of the nest, making use of their tails for both coverlid and pillow. Thus stowed away to their satisfaction, they pass from twelve to sixteen hours in profound slumber.

Like true squirrels, these too gather up a goodly store of acorns and small nuts, which they hide in the hollow of some tall tree, always, for their winter use. Occasionally, during the winter, they bestir themselves, and enjoy a meal, and sometimes venture more, even with the ground covered with snow, for I have caught more than one in box traps set for rabbits.

Except that occasionally they stray into stables and other out-buildings, their home is in the high woods, and there alone they truly are at home. Unlike our grey squirrel, they are not content to put up with saplings and tangled under-brush, when once the "primitive growth" is cut off. That gone, and our pretty, active, but "dull" flying squirrels, too, are gone.

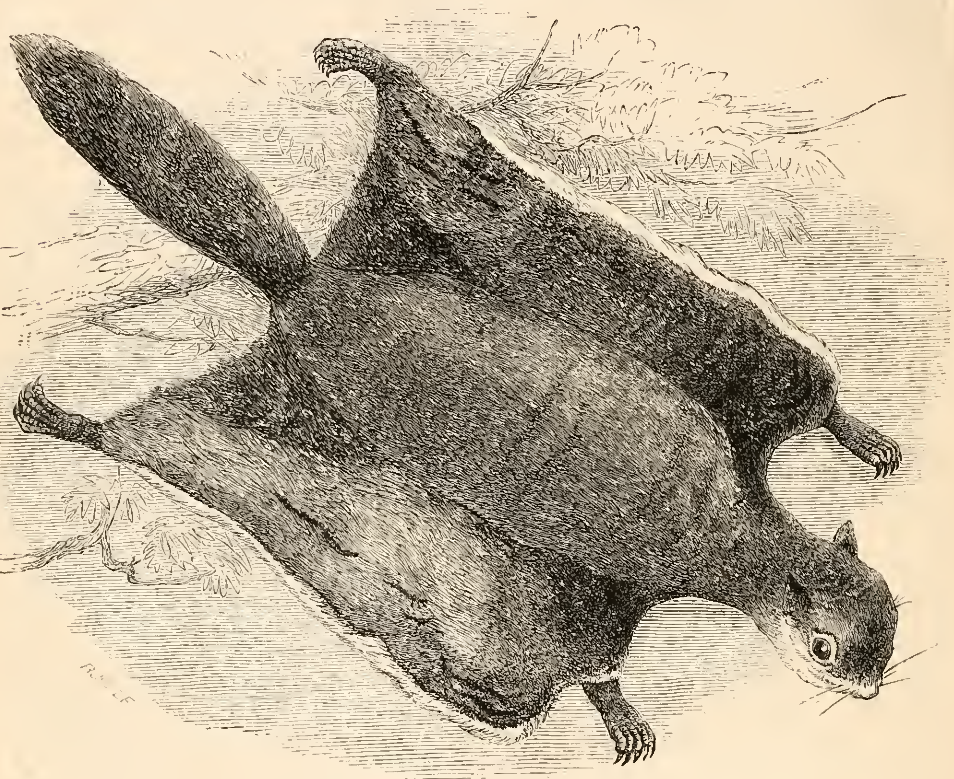

Fig. 66. Flying Squirrel (*Pteromys volucella*).

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"THE task which geologists have to perform is not unlike that of writing the history of a forgotten nation from fragmentay inscriptions in an unknown character and language, and it has to be done in somewhat the same way,"—*Bonney's* "*Manual of Elementary Geology.*"

AMONGST THE CLEARWINGS.

THOSE British moths, known popularly by the name of "Clearwings," and belonging to the section of the Lepidoptera called the Sesidæ, constitute a distinct, singular, and for several reasons, a highly-interesting group. In their general appearance they bear a marked resemblance to bees, wasps, or flies, belonging to the

Fig. 67. Fiery Clearwing (*Sesia chrysidiformis*).

Fig. 68. Orange-tailed Clearwing (*Sesia andreniformis*).

orders Hymenoptera, or Diptera; though not, in all cases, like those we should expect from a consideration of the scientific or vernacular name, which occasionally indicates a fanciful imagination

Fig. 69. Currant Clearwing (*Sesia tipuliformis*).

Fig. 70. Yellow-legged Clearwing (*Sesia cynipiformis*).

on the part of the giver. But each and all, without exception, are unmoth-like externally; it is only by a closer investigation and the knowledge of their real structure and actual transformations, that we can

Fig. 71. Welsh Clearwing (*Sesia scoliæformis*).

Fig. 72. Large Red-belted Clearwing (*Sesia culiciformis*).

rank them amongst the moths; forming part, according to Linnæus, of the genus Sphinx, and included by him amongst the twilight-fliers, though that is far from being their general characteristic. Now, by more recent entomological authors, these transparent-winged moths are massed together, with a host of species most different in size, contour, and habit, in the large division named Nocturni, thanks to M. Guenée, who, if he has, in verification of the old proverb, failed to get due honour in his own land, has certainly had an abundant share of it here.

I scarcely suppose that the most ardent advocate of rapid evolution, as a means of the production of species, would be inclined to assert that these moths took their origin from aberrant individuals of the respective bees or flies they may be held to represent, or *vice versâ*. It would be conceded that there must have been many steps or stages

Fig. 73. Six-belted Clearwing (*Sesia ichneumoniformis*).

Fig. 74. White-barred Clearwing (*Sesia sphegiformis*).

between the two; and, therefore, even on the Darwinian hypothesis, we have not much help given us towards the explanation of the circumstance, that species belonging to such very different

Fig. 75. Red-belted Clearwing (*Sesia myopæformis*).

Fig. 76. Red-tipped Clearwing (*Sesia formicæformis*.

orders appear so nearly alike. Some may say—some have said—that in this resemblance there is nothing worthy of being noted; it is but a freak of nature, a fanciful imitation of as little conse-

Fig. 77. Hornet Clearwing of the Poplar (*Sesia apiformis*).

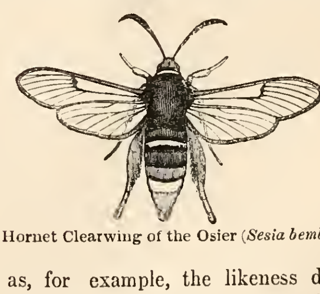

Fig. 78. Hornet Clearwing of the Osier (*Sesia bembeciformis*).

quence as, for example, the likeness discernible in the pattern on the wings of some butterflies to the tracery in the flowers of the fritillary lily. But I hardly venture to speak with positiveness; there is a slight plausibility in the theory pro-

pounded by others, who think that, in some cases at least, the resemblance may be protective, that is to say, the Hornet Clearwing may escape certain of its foes because it looks like the real hornet, a dangerous insect to tackle. True, on the other side, it might also be urged that the resemblance might be a helpful resemblance to the carnivorous hornet; enabling that insect to steal upon other insects as in the guise of a harmless moth! And with regard to the Clearwings, which so nearly approximate in appearance to flies, it can scarcely be averred that the moths are not in as much danger of being snapped up by a bird or insect foe when thus resembling flies, as if they assumed the general aspect of their brethren. That one may be mistaken for the other on the wing I have abundaut evidence, as I have noticed a fly, a species of Asilus, I presume, that is particularly busy in gardens just at the period when the Currant Clearwing (*S. tipuliformis*) comes forth, and which in appearauce and flight is similar, so as to deceive the observer. Probably, the exceeding rarity of several of the Clearwings is due to this; they are passed as flies by the eutomologist, and some of them are scarcely ever seen to alight, for when on the wing they pass quickly from flower to flower, and when they do settle, it is in a place of concealment. The species above named, and one or two others, are less timid, and will settle on leaves in full view.

"Nocturni," so far as these species are concerned, is not a happy designation, for though specimens have now and then beeu taken at sugar or flowers iu the twilight, or later, their natural time of flight is the day, and they prefer suushine to dulness. Some species evidently are of sluggish habit; our Hyde Park friend, *S. cynipiformis*, is one not given to aërial excursions, and I do not believe the floral displays made in other parts of the park succeed in tempting the insect from its rather quiet habitat on the banks of the Serpentine. June aud July, it should be noted, seem the months for the emergence of the perfect insects of all the British Clearwings, and the flight, as pereeivable in the case of the commoner species, lasts about a fortnight. Not that, as I think, individuals live as long as that, but they appear to come out in successiou. Years ago (and it may be so still) there used to be a keen competition amongst the lads belonging to some dealers in insects, who would be first on the spot to "collar" the species referred to above, for the moths had a fancy to quit the pupa at early morn, and as soon as their wings were dry they very judiciously crept down, and hid in the long grass. Hence this species may often be sought aud not fouud, though you may feel sure it is about; and eveu more hopeless often is the search for *S. formicæformis* in an osier plantation; where you may beat, aud beat, and beat in vain. Collectors, wise in their generation, carefully seek for the full-grown larvæ of these and other species in April or May, and for the pupæ a little farther on, aud take their chance of rearing them. The duration of the caterpillar state is variable; in some of the species there is no doubt that the larvæ, hatched in one autumn, live through the next winter, and the one succeeding, so that the round of existence occupies two years. Several entomologists have observed this fact in the instance of *S. apiformis*; and I have myself found, iu the early autumn, larvæ of *S. tipuliformis*, of such proportions as to preclude the idea that they had been hatched during that summer. What is thus ascertained about one gives us a clue to the history of its allies; but yet it is possible, that even in a single species the economy varies from year to year, and that in some seasons a part, or the whole of a brood, may come out in the next year after the larvæ hatched out. We are still much in want of information as to how mining larvæ are affected by changes of temperature, and by dry or damp seasons. But, however, we may venture on the general couclusion, that what is conducive to the vigour of the plant an insect makes its habitat, that is also helpful to the insect.

All these larvæ, as I have hinted, live unseen, and therefore they are best known by their results; when reaching the pupa condition, in some cases the insect is exposed to view, owiug to its coming to the surface of the substance in which it has been reared, though usually the pupa contrives to have a slight protective film of wood or bark. Hence, a moiety of them are doubtless picked up by hungry birds, always on the outlook for anything iu insect shape on the trunks or branches of trees that has not the power of running away. Yet these pupæ have the ability to move to some exteut, as they cau wriggle up and down the mines or passages which the larvæ have made, by the help of a series of recurved hooks or points running along the segments. From their mode of life, it is obvious that these larvæ—which in their maggot-like form and hue do not remiud us of lepidopterous larvæ—must be considered, on the whole, no friends to vegetation. Of *S. apiformis*, it has beeu strenuously asserted that it only attacks poplars that are in an unhealthy condition, therefore it may be called a scavenger rather than a destroyer; and possibly this may be true of the species akin to that which feeds in the osier (*S. bembeciformis*), and of one or two more, certainly not of the majority. There have been those who have endeavoured to show that the Currant and the Red-belted Clearwings do no harm to currant-bushes, or to apple and pear-trees, and I grant that occasionally there may be an increase and not a diminution in the quantity of fruit borne. But as in the case of stimuli resorted to by the human subject, the ultimate result of these efforts to keep up the vitality is a marked depression, aud the issue of the

operations of these internal enemies is the death of the branches or shoots attacked, or even that of the shrub, as seen not unfrequently in the currant of our gardens.

There are fourteen British species of the genus, and it is noteworthy that no less than nine either have been or are now taken near the metropolis, or in those counties approximating to London, and hence furnishing favourite spots to London collectors. This fact suggests that were the whole of Britain as well worked by the entomologist as are the home counties, fresh species would turn up. Though not to be compared in size with others of the Sphinx tribe, the Hornet Clearwings appear amongst their brother Sesiæ like giants in the midst of pigmies. Of the two, *S. apiformis* is the commoner, and it is remarkable for making choice, in some instances, of very small twigs of the poplar. *S. bembeciformis* mixes in the stems of osiers and the solid wood of willows and sallows, and it has occurred on some of the aits or islets of the Thames near London. Mr. Stainton calls the flight of these species sluggish; but if the day is brilliant, they will proceed with some rapidity, though not with the sound the hornet is said to make usually. The Currant Clearwing (*S. tipuliformis*) is only too plentiful about London suburbs and in many other districts; the Red-belted Clearwing (*S. myopæformis*), rather less frequent, is found north and south of the metropolis, and has sometimes swarmed in the orchards of Surrey, near Putney and Barnes. The Hyde Parker (*S. cynipiformis*) has already been referred to; it is also taken in Kent and Essex. By their diligent researches into the birch and alder stumps in the hope of obtaining the large Red-belted (*S. culiciformis*), and the White-barred Clearwing (*S. sphegiformis*), collectors often awaken the wrath of the keepers; rarely, however, are they rewarded by the discovery of the latter insect. The former is not uncommon in several woods near London where birches abound. The Orange-tailed Clearwing (*S. andreniformis*), a very pretty and striking species, the transformations of which are unknown, has been taken in places as remote as Greenhithe, in Kent, and Market Harborough, but only singly. The larva of the Six-belted Clearwing (*S. ichneumoniformis*) lives in the stems of the Stinking Hellebore (*H. fœtidus*), and was at one time taken tolerably freely in sandpits at Charlton, until the destruction of the food-plants extinguished the insects, and the species must now be sought further a-field, being necessarily limited by the range of its peculiar pabulum. The Fiery Clearwing (*S. chrysidiformis*) had been captured in the imago state some years at Folkstone before the larvæ were discovered there at the "Warren," feeding on the roots of dock and sorrel; nor is any other locality known to produce it. In osier and willow beds the larva of the Red-tipped Clearwing (*S. formicæformis*) is sometimes plentiful where it occurs, and also associated with various places near London. It need only be added that the remaining three species are of great rarity; namely, *S. scoliæformis*, *asiliformis*, and *muscæformis*: the first and last have been taken in Wales, the other once or twice in the vicinity of London.

MICROSCOPY.

Butter Globules in Milk.—It is probable that many amateur microscopists are not aware that butter globules can be seen in milk immediately on its leaving the cow. A drop of milk examined with a pretty high power shows many thousands of the globules floating about in the fluid. These are rather lighter than the fluid itself, and they gradually rise to the top, forming cream. After being dashed against each other for a time (or churned, as the term is), they adhere together, and we have butter. An attempt was once made to puzzle me by an incredulous hearer of mine by bringing me buttermilk *as milk* for examination. I immediately detected the fraud, and declared the true name of the fluid. The fact was that nearly all the butter globules were absent. I have lately succeeded in mounting these globules as dry objects, and the operation is very simple. I place on some ten or twelve slides drops of milk, and cover them with thin glass covers, as if for examination, and I leave them for a few days to dry. By this time the fluid has evaporated and left the butter globules behind, and out of the lot I have found about three slides sufficiently good for permanent use, sometimes even more.—*J. Brittain.*

Parasitical Vorticellæ on Cyclops.—As the above appears to be a very rare, if not quite unequalled phenomenon, it may perhaps interest some of your microscopical readers to hear more about it. I was intending to mount in glycerine jelly a specimen of *Cyclops quadricornis*, and preparatory to doing so, had placed one with a very small quantity of water upon a glass slide, when, to my great astonishment, I perceived attached to one of its antennæ a bunch of small objects, which at a second glance proved to be vorticellæ. There were about fourteen individual vorticellæ, all of which appeared to spring from about the same point, although each bell possessed a separate stalk. Although in many respects this resembles the *Vorticella nebulifera* (described by Dr. Carpenter, p. 477, fig. 196), it is evidently an entirely different species, as it does not possess the characteristic contractile stalk. In spite of this, however, the animals appeared to be living very happily together, creating wonderful currents in the water, and treating with apparent indifference the extraordinary movements of their living host. Can any of your readers tell me if I am right in

believing this to be the *Epistylis parasitica?* to which belief I am led by its close resemblance to *E. plicatilis*, of which a plate may be found in *Ann. & Mag. Nat. Hist.*, s. 4, vol. ix. pl. 16, fig. 4.—*H.E.P.*, *Long Eaton.*

A New Oblique Light Illuminator.—The utility of a more or less oblique pencil of light has long been recognized by those who use the higher power of the microscope. The instruments contrived for obtaining this have been various, and many of them very complicated and expensive, and, so far as my own experience goes, none of them have produced a more effective oblique ray than can be obtained by a mirror on a separate stand, or the lamp placed at an angle with the axis of the microscope. The Rev. J. Bramhall, of Lynn, has called my attention to the following arrangment, and asks if it is new, which, so far as I am aware, it is. The subjoined diagram will enable

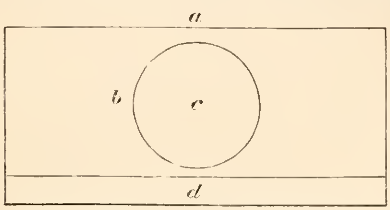

Fig. 79. The Bramhall Oblique Illuminator.

any one possessing the slightest mechanical ability to manufacture one of these illuminators without difficulty. a is a piece of wood $3\frac{1}{4}$ inches in length, $1\frac{1}{2}$ inch in breadth, and $\frac{3}{16}$ of an inch thick; the central perforation b is $\frac{3}{4}$ of an inch in diameter, in which is placed a silvered disk of glass or metal, c, the face of which should be not less than $\frac{1}{8}$ of an inch below the upper surface of the wood, d, a ledge for the slide to rest against. We will now describe the method of using it, premising that a light of considerable obliquity is required. The wooden stage, with its mirror, is placed on the stage of the microscope, and the lamp elevated some 3 or 4 inches above it, and a beam of light condensed upon the mirror by means of a "bull's-eye." I need scarcely observe that the obliquity of the reflected beam depends upon the angle at which the ray impinges on the mirror. The objectives with which the illuminator was tested were a $\frac{1}{8}$ of Baker's, made many years ago, but a very good glass, and a "Beneche No. 7," using the following objects as tests:—*Navicula rhomboides*, *N. cuspidata*, *N. peregrina*, *N. rostellum*, *Synedra robusta*, *Nitzschia sigmoidea*, *N. sigma* (the finely-marked variety called by Möller *N. curvula*), and *Lepidocyrtis curvicollis*. The $\frac{1}{8}$ resolved the transverse striæ of *N. rhomboides*, which it had not done before; the longitudinal striæ on *N. cuspidata* shown very sharp and distinct, as were also the transverse striæ on costæ of *N. peregrina* and *S. robusta*. The beautiful curved striæ on *N. rostellum* were better shown than I have ever before seen them. *N. sigmoidea*.—The striæ resolved with as much ease as those on *Pleurosigmaa angulatum* with a $\frac{1}{4}$. *N. sigma* as difficult as *N. rhomboides*. The "Beneche" resolved *N. sigmoidea*, *N. rostellum*, *N. peregrina*, and *S. robusta*. The podura scale was shown well, but not better than by a less oblique ray. The mirror would probably be more effective if mounted so as to slide up or down in the substage tube;* but this, of course, would be more expensive. It is desirable that the cover should not be attached to the slide with the usual black varnish, but with "dammar," or some similar transparent cement. Mr. Baker, of 244, High Holborn, London, has undertaken to supply both kinds of the "Bramhall oblique illuminator."—*F. K.*

Soirée of the Royal Microscopical Society.—On Friday, April 21st, a large *soirée* was given in the apartments of King's College, by the President of the Royal Microscopical Society, to the Fellows. Invitations were issued for above 1,500, including the whole of the Fellows of the Royal Microscopical Society, and all the distinguished foreigners now in London as Commissioners from the various Foreign Governments to the Exhibition of Scientific Apparatus at South Kensington. After having been received by the President (Mr. Sorby), the visitors passed into the various rooms of the College, in which were exhibited many objects connected with microscopical science. Amongst the new instruments may be mentioned Mr. Sorby's arrangement for accurately measuring the wave-length of the centre of absorption-bands in spectra; a new form of Stephenson's erecting binocular microscope, by Mr. Bevington, and another by Mr. Browning, of somewhat different construction. Mr. Browning also exhibited his new portable microscope, which is so constructed that the body can be turned on one side, and reversed in such a manner as to reduce the height to about one-half. The President also exhibited a large series of specimens illustrating his own special subjects, shown by means of fifty microscopes, lent to him by four of the principal makers in London (Becks, Browning, Crouch, and Ross); and about 150 first-rate instruments and objects were contributed by the fellows of the society and other friends. These were so distributed over the large apartments of the College as to avoid crowding in any part. Almost every branch of science to which the microscope has been applied was represented. Many very interesting living objects were sent direct from the Brighton

* Further experiments prove this to be the case. A second and smaller bull's-eye, placed as close as practicable to the stage, in order to further condense the light, is desirable. With sunlight the resolving power of the objective is greatly increased.

Aquarium and elsewhere. In the lecture theatre were exhibited Dr. Hudson's drawings of microscopic objects shown in a new manner as transparencies; Mr. Spottiswoode's splendid polarizing apparatus, and various objects shown with the oxyhydrogen microscope by How & Co. One of the most satisfactory results of the *soirée* is the great impression produced by it on the foreign scientific men, who appear to have been greatly surprised at the extent and nature of the gathering.

Markings on Surirella Gemmæ.—Would any correspondent of yours inform me how to treat a slide of *Surirella Gemmæ* (dry-mounted for a $\frac{1}{25}$), so as to bring out the markings given in Dr. Carpenter's book on the Microscope, fifth ed. p. 214? I have failed with Beck's $\frac{1}{10}$ imm., but suspect that the failure arises rather from a defective mode of illumination than from want of magnifying power. —*Isabella L. Bird.*

Varnish for Glycerine Mounts.—I should feel greatly obliged if some microscopical reader of Science-Gossip could tell me of some trusty varnish for finishing off slides mounted in glycerine. I know of several, but they would have to be made at home, and I want to buy ready-made at a shop, so that it could be applied at once. Many valuable slides in my cabinet have been destroyed through the varnish I have used in finishing having "run in."—*Charles Williams, Redland.*

ZOOLOGY.

Hatching Silkworms' Eggs.—The silkworm (*Bombyx mori*) is a native of China. Like other Lepidoptera, the silkworm lays eggs (which are nearly round, and rather less than a mustard-seed), and exists in the three usual states. In April the eggs should be exposed to the heat of the sun, and they will begin to hatch; they should be placed in cardboard boxes, covered over at the top with a net. At birth, the larva is about one-third of an inch in length. Its colour for the first ten days is generally a bluish-black, afterwards a bluish-white, and when ready to spin, a semi-transparent yellow colour, like a ripe white grape. The time occupied during the larva state is about thirty days, or may be extended to forty-five by varying the temperature of the cocoonery. As soon as hatched, they should be fed on lettuce-leaves until they begin to get large, when they must be fed entirely on mulberry-leaves. When ready to spin, they raise their heads, and a portion of their bodies, moving them about as if in search of something, until they find a suitable place for the construction of the cocoon. This they perform by attaching the slender silk filament at various points; and, then by a rotary motion of the head, spinning the silky thread around them, until completely hidden from view. Count Dandolo estimated the length of this thread at about six hundred and twenty yards. In two or three days, the cocoon will be completed, and the insect will have undergone its first metamorphosis, and entered the chrysalis state; in eight days the cocoons may be gathered. The chrysalis, when not destroyed, requires a period of from fifteen to twenty days before undergoing the second metamorphosis, when the moth makes its appearance, forcing its way through the cocoon, breaking the slender threads of silk; thus diminishing, if not destroying its value. The males first appear, and are readily recognized, as they are smaller than the females, move about more briskly, keeping their wings in a continual flutter without flying. The moths eat nothing, and live but a few days, during which time the female deposits her eggs, to the number of about five hundred, which should be put into a dry drawer, until the following spring, when they will require the same attention as before.—*Joseph G. Henderson.*

The Silvery Hair-tail (*Trichiurus lepturus*) found in the Moray Firth at Banff.—On April 3rd a mutilated specimen of the above rare fish was found by some boys in the sea amongst the rocks near our harbour. When taken out of the water, the tail and a portion of that part of the body was found to be wanting, and the dorsal fin, except a few of the rays, was completely gone, as also the pectorals. The head likewise was considerably damaged. In length, although thus broken, it measured 10½ feet; in breadth, about the middle, about 1 foot; and in thickness from 2 to 2½ inches. When entire, this example must have been over 12 feet in length. Its appearance, notwithstanding that it had been dead and tossed about some time, was like that of a long sheet of highly-burnished silver.—*Thomas Edwards, Banff.*

Capture of Cynthia Huntera in England.—Mr. Lovekin's inquiry in your February number in reference to the reported capture of this species in England, induces me to inquire whether there is any record of its capture there at any time previous? The close resemblance of *Huntera* to *Cardui* may easily mislead any one not acquainted with both so-called species. My opinion is that they are mere varieties, *Huntera* being the more common of the two in this vicinity. Large eye-spots near the margin of the underside of the secondaries is the distinctive mark of *Huntera*, those in *Cardui* being small; but a large series of *Huntera* would show spots of many different sizes. Some year or two since I obtained from Ohio a very remarkable variety of *Huntera*, differing from the type, inasmuch as that the primaries were of a very dark brown, nearly black, with the exception of a rather large discal patch of the ordinary orange-colour, a

black conical spot projecting from the costal margin to near the inner angle of the discal cell. I hope to see this remarkable variety figured in Strecker's admirable work now in course of publication. I shall be glad to send *Huntera* to any of your readers who may wish to verify that species.—*W. V. Andrews, Brooklyn, New York.*

Northamptonshire Naturalists' Society and Field Club.—A long-felt want has at length been remedied by the formation of the above society, under the presidency of Lord Lilford, Mr. C. Jeeks secretary, and a committee consisting of the Rev. S. J. W. Sanders, Rev. G. Nicholson, Rev. R. S. Holmes, and Messrs. S. Dadford, G. C. Druce, E. Durham, — Storey, and G. Osborne. During the four summer months as many field excursions will be made, and a monthly meeting during the remainder of the year will be devoted to the reading of papers and exhibition of objects and specimens. Already the society has about seventy members, and the opening meeting, when Lord Lilford delivered the inaugural address, was held on April 21, 1876. It is trusted that the natural history of Northamptonshire, which has for a long time been neglected, will by the help of this society be thoroughly explored.

"Collecting and Preserving."—Our position with reference to this attractive-looking little volume prevents us doing other than drawing attention to the fact that it has just been published by Hardwicke & Bogue, 192, Piccadilly. It consists of a collection of articles by experts on the collecting and preserving of all kinds of natural-history objects, and we hope it will prove of that value to young students it was originally intended the articles should have.

A Rare Foreigner.—At a recent meeting of the Zoological Society of London, Mr. G. Dawson Rowley exhibited and made remarks on a specimen of *Machærirhynchus nigripectus*, a New Guinea bird, which is believed to be the first specimen that has yet reached this country. At the same meeting Mr. Osbert Salvin exhibited and made some remarks on a piece of a trunk of a pine, from Guatemala, which had been perforated by a woodpecker (*Melanerpes formicivorus*), for the purpose of storing acorns.

Lankester's "Practical Physiology."—This most useful and trustworthy little book, published at 192, Piccadilly, has now reached the sixth edition. We should be glad to see it reach the *sixtieth*, in order that the knowledge of the human frame and functions therein so simply described might be in the possession of every man and woman in Great Britain.

BOTANY.

Veronica Buxbaumii, Ten., has been so prominent before me during the whole of the inclement winter that I cannot resist sending you a few notes upon it. My whole farm is full of it, and its grand bright blue flowers have shone forth with the sunshine on every bright day all through the winter. It principally affects our arable fields, in which the *V. agrestis* is a comparatively rare form; but it seldom occurs in the gardens, where, however, the *V. agrestis* is much more frequent. There is also met with here what I might term a modified form of *V. Buxbaumii* with larger flowers and foliage than the *agrestis*, and yet not so large as the Buxbaum's Speedwell, as figured so well in the new edition of "English Botany." It is possible that this is a hybrid between the two. It seems clear to me that the introduction of the newer agrarian weed is gradually driving out the older one. The *V. Buxbaumii* is not mentioned in Sir J. E. Smith's second edition of the "English Flora," and now it is found tracking artificial pasturage everywhere, being doubtless introduced in foreign agricultural seeds.—*J. Buckman, Bradford Abbas.*

Oldham Microscopical Society and Field Club.—Mr. J. Nield brought to a close the winter series of the papers of this vigorous society by reading his "Notes of a Highland Tour in Quest of Alpine Plants." A number of Alpine plants —cryptogamic and phænogamic—were laid on the table. These plants are of great interest for their bearing on the geologic history of the country, being the remains of a flora which, in the remote past, was more generelly diffused over the land. They are, more strictly speaking, the outliers of the flora of Scandinavia than that of the British isles. Mr. Nield and his companions left home on Saturday, July 12th. For the first few days they made their home at the head of Loch Tay, afterwards removing to the foot of Ben Lawers, and about eight miles from Killin, on the Kenmore road. From these points the principal mountains of the Breadalbane group—Mael Ghyrdie, Craig Challiach, the Tarmichan, Craig na Gower, and Ben Lawers—were climbed in succession, and some of the rarest plants in Great Britain were gathered. The following is a list of the plants collected on the Ben Lawers group of mountains:—*Flowering Plants:* Myrica gale, Viola amœna, Habenaria bifolia, H. chlorantha, H. albida, Gymnadenia conopsea, Veronica scutellata, V. saxatilis, V. humifusa, Gentiana nivalis, G. campestris, Saussuria alpina, Epilobium alpinum, E. alsinifolium, Potentilla alpestris, Saxifraga nivalis, S. stellaris, S. oppositifolia, S. cernua, S. azoides, Gnaphalium supinum, Tofieldia palustris, Thalictrum alpinum, Draba incana, D. rupestris, Cerastium alpinum, Vicia

sylvatica, Salix herbacea, S. reticulata, Arenaria verna, A. rubella, Dryas octopetala, Vaccinium uliginosum, Myosotis alpestris, Sibbaldia procumbens, Sedum villosum, Cherleria sedoides, Alchemilla alpina.—*Grasses:* Sesleria cærulea, Poa alpina.—*Carices:* Carex fulva, C. palescens, C. curta, C. rigida, C. pauciflora, C. capillaris, C. ampulacea, Kobresia caricina.—*Rushes:* Juncus triglumis, G. trifidus, Luzula spicata.—*Ferns:* Asplenium trichomanes, A. viride, Aspidium Lonchitis, Woodsia hyperborea.—*Mosses:* Grimmia maritima, G. torta, G. spiralis, Orthotrichum Drummondii, O. Bruchii, O. stramineum, O. Ludwigii, O. crispum, O. Lyellii, Hypnum splendens, H. loreum, H. crista-castrensis, H. annulosum, H. falcatum, H. sarmentosum, H. pulchellum, Bryum alpinum, B. elongatum, B. Zierii, B. sanguineum, Oligotrichum hercynicum, Pterigonium filiforme, Arctoa fulvella, Conostomum boreale, Diphyscium foliosum, Physeomitrium ericitorium, Dicranum Starkii, D. Blythii, D. fulcatum, Aulocomnium palustris, Splachnum vasculosum, Tetraplodon mnioides, Zygodon lapounicus, Stylostigium cæspiticium, Blindia acuta, Racomitrium lanuginosum.

Botany of the Black Country.—It is generally supposed that the "black country" is a dark, dreary district, with nothing but coal-pits, forges, smoke, and chimney-stacks, and botanically, a place without interest. The following imperfect sketch of its flora may not, therefore, be uninteresting to some of your readers. Of all places hereabout, Dudley Castle and the Wren's Nest Hill are perhaps the most pleasantly situated and most interesting, more particularly from a geological point of view, as they are abundantly rich in trilobites and other Silurian fossils. Botanically, they are not rich in rare specimens, but have, nevertheless, an abundance and variety of vegetation, the old ruins being covered with the common wall-flower (*Cheiranthus Cheiri*), with here and there a specimen of *Echium vulgare*, and on the castle tower the graceful *Linaria Cymbalaria* (no doubt originally introduced), which has been very plentiful, although decimated of late by visitors. On various parts of the hills may be found the pretty little *Polygala vulgaris*, *Sanicula europæa*, *Cornus sanguinea*, *Picris hieracioides*, *Tussilago Petasites*, *Lactuca muralis*, *Atropa Belladonna*, *Arum maculatum*, *Carex acuta;* beneath the trees a great profusion of *Mercurialis perennis*, and a few specimens of *Lathræa squamaria;* besides several plants peculiar to, or more frequent in, limestone districts; as *Carlina vulgaris*, *Carduus eriophorus*, *C. nutans*, and *Plantago media*, in considerable numbers. The pit-banks and "swags" caused by mining, which present so dreary and deserted an aspect to the casual observer, are to the botanist very interesting, being rich in vegetable life; the banks producing *Sisymbrium officinale*, *Reseda luteola*, *Genista tinctoria*, *Potentilla procumbens*, *Conium maculatum*, *Matricaria Chamomilla*, *Erigeron acris*, various *Senecios*, *Linaria vulgaris*, *Arctium Lappa*, and many other species of Crucifers, Cloveworts, and Composites: and the "swags," *Ranunculus aquatilis*, *R. scelcratus*, and *R. Flammula*, *Potamogeton natans*, *P. crispus*, and *P. pectinatus*, *Barbarea vulgaris*, *Nasturtium palustre*, *Myriophyllum*, *Helosciadium nodiflorum*, *Bidens cernua*, and *B. tripartita*, *Ceratophyllum demersum*, the common water-pest *Anacharis alsinastrum*, several varieties of Juncus, Carex, and Scirpus, *Sparganium ramosum*, Equisetum, and Chara; and are full of interest for the microscopist, being loaded with Diatoms, Desmids, Rotifers, &c. If we stroll the semi-country lanes, we see here the hedgerows covered with the stems of *Humulus lupulus*, *Bryonia dioica*, and *Convolvulus sepium*, or black with the leaves of *Tamus communis*, and the ditches filled with *Caltha palustris*, *Senecio erucifolius*, and *S. aquaticus*, *Inula dysenterica*, and *I. Conyza*, *Mentha aquatica*, *Dipsacus pilosus*, and *Polygonum Bistorta*, and redolent with the odour of Spiræa; there the banks bright with the flowers of *Galium Mollugo*, and other Stellates, *Lactuca muralis*, *Solanum nigrum*, *Verbascum Thapsus*, and with the graceful leaves of Sanguisorba, or the corn-fields studded with *Thlaspi arvense*, *Camelina sativa*, *Æthusa Cynapium*, *Chrysanthemum segetum*, *Cichorium Intybus*, and other weeds of cultivation. In the woods and dells we have the pretty *Lysimachia nemorum* for a carpet, with *Hypericum dubium*, &c., *Adoxa moschatellina*, *Lamium galeobdolon*, and *Convolvulus minor*; and in and near the streams *Nuphar lutea*, *Nasturtium amphibium*, *Eupatorium cannabinum*, and *Sagittaria sagittifolia*. This short sketch gives an idea of the number of species to be found in the district. There is still a wide field for research, and ample scope for the student.—*W. Bradley, Dudley.*

Gagea lutea and other Plants in Northamptonshire. — Some three years ago I was shown a plant of *Gagea lutea* which had been gathered in the county, but which, after diligent search, I was unable to find. Last year I was rewarded by finding the leaf, and this year the plant itself, though rather past flowering. It occurs but very sparingly on an old shady hedge-bank, where it is almost choked by a rank growth of *Mercurialis*, hyacinth, and little adoxa. The *Gagea*, though rather widely distributed, is, I think, a plant seldom found in England. From the great length of Northamptonshire, nearly seventy miles, a thorough investigation by one individual is almost out of the question; but by the aid of our newly-started Naturalist Society we hope to make a

pretty complete list. I have personally found about 620 plants in the county, and there exist notices relative to the occurrence of about ninety others, many of which I am afraid are now extinct. Among the most interesting plants may be mentioned the *Cotyledon umbilicus*, which still covers in great profusion every wall in and about Litchborough; *Atropa Belladonna*, which may be found quite wild in Bedford Purlieus; where also may be gathered *Convallaria majalis*, *Euphorbia amygdaloides*, *Lamium galeobdolon* (a not unfrequent plant on stiff soil throughout the county), and *Aquilegia vulgaris*. On Fotheringhay Castle moat-sides grow *Ranunculus parviflorus*, *Hyoscyamus niger*, and *Onopordon acanthium*, called by the villagers "Queen Mary's Thistle." In Harleston Firs occur *Juncus supinus*, *Hydrocotyle vulgaris*, *Hypericum calycinum* quite naturalized, *H. humifusum*, *Ophioglossum vulgatum*, *Blechnum boreale*, *Lastrea spinulosa*, *dilata*, *A. aculeatum*, *A. Filix fœmina*, *A. ruta-muraria*, and *Adiantum nigrum*, *Rosa spinosissima*, and *Pedicularis sylvatica*. In Salcey Forest may be gathered *Lathyrus sylvestris*, *Neottia nidus-avis*, and *Serratula tinctoria*. In the old Forest of Whittlewood, wherever the underwood is cleared, a number of specimens of *Epipactis latifolius* spring up. *Verbascum Thapsus* and *Nepeta Cataria* are very common, and *Juncus compressus* is not unfrequent near the forest. On cultivated ground may be gathered the pretty *Anagallis cœrulea*, *Linaria elatine* and *spuria;* the latter, in 1875, showing the peloria growth almost as frequent as the ordinary flower. *Inula conyza* and *Helminthia echioides* are also frequent. Near Northampton may be found *Crepis taraxacifolia*, *Carex paludosa*, v. *spadicea*, *Spirea filipendula*, *Polygonum bistorta*, *Rumex pulcher*, and *Artemisia absinthium;* while in Yardles Chase, *Paris quadrifolia*, *Carex strigosa*, *Helleborus fœtidus*, and *Daphne laureola*, are not uncommon. Peterborough district would well repay working, and also that portion of the county drained by the Avon and Welland. Henslow found the Spider Orchis at Southorpe; and Watson, in his "Cybele," mentions the occurrence of *Ajuga chamæpitys*, *Cynoglossum montanum*, *Teucrium scordium*, and *Euphorbia platyphylla* in the northern division of the county.—*G. C. Druce.*

The Effect of the Past Winter on Evergreens.—I have not heard how evergreens have fared in other parts of the country, but at Brighton their appearance has been such as to strike every one with surprise and regret. The bay-trees (*Laurus nobilis*) have still their leaves, but these, with some few exceptions, are perfectly brown; and the Euonymus, the great ornament of Brighton in the winter, for the most part have their leaves white or light brown instead of green; the evergreen oak also, and the pretty evergreen *Medicago arborea*, have suffered greatly. They will recover as summer approaches, but their growth may have been considerably checked. Horticulturists differ in opinion as to the cause of the injury. I do not remember when the Euonymus, of which there are tens of thousands at Brighton, was affected by the frosts or the strongest winds, and the bay-tree and evergreen oak have rarely suffered. Some are of opinion that the mischief has been caused by the unusually frequent variation from frost to rain, accompanied by the most violent winds from the sea; while others think it was caused by the salt spray from the sea during the storms; but although the air, no doubt during such storms, is filled with briny vapour to a considerable distance, the spray itself could not reach so many hundred yards. Others, again, consider it was caused by the severe frost (ten degrees below freezing) in the early part of March, followed by a warm sun, when the sap was beginning to rise; but the plants were certainly very much cut at an earlier period. It is singular that when growing against a house or a wall the evergreens generally have not been injured, apparently because the frosty winds could not *pass through* the shrubs, although the frost itself was equally severe. With but few exceptions the young and old plants of Euonymus have suffered, but I have invariably observed that the principal injury has appeared on the *windward side* (south-west). Upon the whole, I am induced to think that the first above-mentioned cause is the correct one, though in many cases near the sea the spray and briny liquid may have had much to do with it. I fear it is hopeless to expect that any precautions can guard against a recurrence of the mischief in another such a winter as the past. It is a curious fact that many of the plants of the Euonymus which have escaped have had their young shoots actually growing with a spring-like appearance during nearly all the winter, even very near the sea, not at all affected, although in places most exposed to the spray and winds.—*T. B. W., Brighton, April*, 1876.

"Botanical Names for English Readers."—It is with great pleasure that we draw the attention of the less scientific of our readers to this valuable book. The author, Mr. Randal H. Alcock, is a well-known Lancashire botanist, and comes from a family of naturalists. He fully knows the difficulties which artisan naturalists have to contend with in not knowing the Latin and Greek languages, and he has set himself, in a most praiseworthy spirit, to the task of making things clear to them in this respect. Latin and Greek are not botany, nor zoology, nor geology; although we have seen many a man smiled at for making a false accentuation of words from these languages, when he was describing natural phenomena with which he was intimately acquainted. We are much pleased with the kindly notice which the *Journal of Botany* gave to this

little book in its last number; the writer evidently sympathized with Mr. Alcock's well-carried-out intention. Mr. Alcock has simplified and explained the Latin and Greek words very ably, and has further given the right mode of pronouncing them. A capital sketch of the history of botanical nomenclature, &c., is also given. The book is published by L. Reeve & Co.

The Sphagnaceæ of Europe and North America.—We are glad to learn that Dr. Braithwaite has arranged to publish, as a monograph, the twenty-six beautiful plates which appeared in the *Monthly Microscopical Journal*, and to append to them a full account of the literature and anatomy of the order. Dr. Braithwaite has also in preparation a volume of *Sphagnaceæ Britannicæ Exsiccatæ*, to embrace, on fifty sheets imperial quarto, the choicest dried specimens of all the forms. The difficulty in obtaining full sets of these will necessarily limit the issue, which we believe is to be confined to fifty-two subscribers.

GEOLOGY.

The Physical History of the Dee, Wales.—This was the title of a most interesting paper recently read before the Geological Society by Prof. A. C. Ramsay. The author stated that he regarded the valley of the Dee as mainly preglacial throughout, and sketched the physical history of the region through which it runs. The Silurian rocks were much disturbed and denuded before and during the Carboniferous period, and the carboniferous limestone was deposited very uncomformably on the upturned edges of both lower and upper Silurian strata, and once spread all over the region, probably overlain by the millstone grit and coal-measures, as now in the east of Denbighshire and Flintshire. The region was again disturbed and elevated during the formation of the Permian deposits, and then by subaërial denudation a great part of the carboniferous series was removed down to the old plain of denudation of the Silurian rocks, the surface of which thus probably stood higher than it does at present, being in the midst of a broad continental area. From a consideration of the conditions of deposition of the mesozoic and tertiary formations, the author concluded that, from the beginning of the Permian to that of the Glacial epoch, the higher ground of Wales was land well raised above the sea, except perhaps during the deposition of the chalk, and that during all this period it was exposed to the influence of subaërial agents of denudation. He indicated the conditions of elevation of the old table-land of carboniferous rocks, and showed that it had probably a slope towards the east and north-east to the extent of about 23 feet in a mile. The drainage of this land then flowed in an easterly and north-easterly direction along the earliest channel of the Dee, which would be at an elevation from 1,300 to 1,400 feet higher than the present channel. During the Glacial epoch ice-action deepened, and more or less modified the existing channel, and scooped out the basin of Bala Lake, which was not previously in existence. The general results of this investigation are as follows:—After the last important disturbance of the pre-permian rocks, North Wales was carved slowly and by subaërial agencies into its present mountainous form, chiefly between permian and preglacial times. The work of the glaciers of the latter period somewhat deepened, widened, smoothed, and striated the minor outlines of the mountains and valleys, and excavated many rock-bound lake-basins, but did not effect any great changes in the contours of the country. A minor submergence of part of Britain during part of the Glacial epoch produced no important effects on the large outlines of the rocky scenery; and the effects of subaërial waste subsequent to the Glacial epoch have been comparatively small.

Organic Remains in the Metamorphic Rocks of Harris.—Prof. Nicholson and Mr. James Thomson, F.G.S., announce that that they have recently discovered evidence of life in the so-called "Laurentian Rocks" of Harris, in the Hebrides. The specimens are clearly organic in their structure, and are well and minutely preserved. Messrs. Nicholson and Thomson are now engaged on a microscopical examination of the specimens; but they have first very properly drawn attention to the interesting fact that unequivocal organic bodies occur in such ancient deposits as the lowest metamorphic rocks of Harris. The skeletons of the fossils discovered are little altered, and are believed to be calcareous. It is suggested that a full knowledge of these ancient structures will materially assist in settling the *Eozoon* controversy.

"On some Fossiliferous Cambrian Shales near Carnarvon."—Messrs. J. E. Marr and Henry Hicks, F.G.S., read a paper before the Geological Society, on March 8th, on the above subject. The shales described extend from about three miles S.W. of Carnarvon to Bangor, running nearly parallel to the Menai Straits. They are faulted against Lower Cambrian to the east, and disappear against a dyke on the west. The shales vary from greyish-black to bluish-black in colour, and are generally sandy and micaceous, but in places chiefly clayey. Fossils were obtained from three places on the banks of the Seiont; namely, Point Seiont (where the beds are concretionary in structure), along the whole tramway from Carnarvon to Wanttle, and near Pelbig Bridge. The first-named locality is richest in fossils; and here there is a greenstone dyke parallel to the bedding of the rock, and altering the shales for

a distance of about four yards from the edge of the dyke. The fossils seem to indicate that the deposit belongs to the upper part of the Arenig group. Mr. Hicks pointed out that the fauna clearly showed that these beds belong to the Arenig group, many of the species being identical with those found in the upper part of that group at St. David's Shelve, and in Cumberland. The new species found by Mr. Marr are a *Caryocaris* (*C. Marris*) and an *Æglina* (*Æ. Hughesii*). The other fossils were *Didymograptus indentus*, *D. bifidus*, *D. Murchisonii*, and the var. *furcillatus*. The rock in its general character is extremely like that at the same horizon in the succession at St. David's Shelve, and in Cumberland, and indicates, therefore, the prevalence of similar physical conditions when deposited. The rock is such as would be formed over an even sea-bottom at some considerable distance from land and in moderately deep water. Mr. Hicks looked upon this discovery as of considerable importance, since it clearly proved the position of beds hitherto imperfectly known, and moreover shows that similar conditions prevailed over extensive areas at the time these beds were deposited. It also furnished further evidence in support of Mr. Hicks's opinion that no break occurs anywhere in the Welsh area between the Cambrian and Lower Silurian rocks.

The Bone-caves of Creswell Crags.—This was the title of another paper read before the Geological Society, by the Rev. J. M. Mello, M.A., F.G.S. The author gives an account of the continuation of his researches upon the contents of the caves in Creswell Crags, Derbyshire. The further exploration of the Pin Hole cave described in his former paper, furnishes a few bones of reindeer, *Rhinoceros tichorhinus*, and other animals, but no more remains of the Arctic fox, which were particularly sought for. Operations in this cave were stopped because the red sand in which the bones were found towards the entrance, became filled with limestone fragments, and almost barren of organic remains. The author then commenced the examination of a chambered cave called Robin Hood's Cave, situated a little lower down the ravine on the same side. The section of the contents of this cave showed a small thickness of dark surface-soil, containing fragments of Roman and mediæval pottery, a human incisor, and bones of sheep and other recent animals; over a considerable portion a hard limestone breccia, varying in thickness from a few inches to about 3 feet; beneath this a deposit of light-coloured cave-earth, varying in thickness inversely to the breccia, overlying a dark red sand about 3 feet thick, like that of the Pin Hole, but with patches of laminated red clay near the base, and containing scattered nodules of black oxide of manganese, and some quartzite and other pebbles, which rested upon a bed of lighter-coloured sands containing blocks of limestone, probably forming part of the original floor of the cavern. The hard stalagmitic breccia contained a great many bones, chiefly of small animals, but with some of reindeer, and teeth of *Rhinoceros tichorhinus*, hyæna, horse, water-vole, and numerous flint flakes and chips, and a few cores. Some of the flakes were of superior workmanship. A few quartzite implements were also found in the breccia. The cave-earth contained a few flint implements, but most of the human relics found in it were of quartzite, and of decidedly palæolithic aspect. There was also an implement of clay-ironstone. The animal remains chiefly found in the cave-earth were teeth of horse, *Rhinoceros tichorhinus*, and hyæna, and fragments of both jaws of the last-mentioned animal. Bones and teeth of reindeer, and teeth of cave-lion and bear also occurred. The red sand underlying the cave-earth contained but few bones, except in one place, where antlers and bones of reindeer and bones of bison and hyæna occurred. At another part a small molar of *Elephas primigenius* was found. A large proportion of the bones had been gnawed by hyænas, to whose agency the author ascribed the presence of most of the animal remains found; but he remarked that no coprolites of hyænas had been met with. The following is a list of the animals whose remains occurred in this cavern:—*Felis leo* (var. *spelæa*), *Hyæna crocuta* (var. *spelæa*), *Ursus arctos*, *U. ferox*, *Canis familiaris*, *C. lupus*, *C. vulpes*, *Elephas primigenius*, *Equus caballus*, *Rhinoceros tichorhinus*, *Bos bison*, var. *priscus*, *Bos longifrons*, *Capra hircus*, *Sus scrofa*, *domesticus*, and *ferox*, *Cervus megaceros*, *C. tarandus*, *Arvicola amphibius*, and *Lepus timidus*. Professor Dawkins afterwards read some notes on the Mammalia and Traces of Man found in the Robin Hood Cave, and noticed the various species of animals discovered by Mr. Mello, and drew certain conclusions, from their mode of occurrence, as to the history of Robin Hood's Cave. He considered that the cave was occupied by hyænas during the formation of the lowest and middle deposits, and that the great majority of the other animals whose remains occur in the cave were dragged into it by the hyænas. That they served as food for the latter is shown by the condition of many of the bones. During this period the red sand and clay of the lowest stratum was deposited by occasional floods. The red loam or cave-earth forming the middle stratum was probably introduced during heavy rains. The occupation of the cave by hyænas still continued, but it was disturbed by the visits of the Palæolithic hunters. The remains found in the breccia indicate that the cave was inhabited by man, and less frequently visited by hyænas than before. The presence of vertebræ of the hare in the breccia would imply that the hunters who occupied the cave had not the dog as a domestic animal. After a discussion of the rela-

tions of the animals forming the fauna of the cave, the author proceeded to describe the traces of man found in it, which consist of fragments of charcoal, and implements made of antler and mammoth tooth, quartzite, ironstone, greenstone, and flint. The distribution of these implements in the cave represents three distinct stages. In the cave-earth the existence of man is indicated by the quartzite implements, which are far ruder than those generally formed of the more easily-fashioned flint. Out of 94 worked quartzite pebbles only 3 occurred in the breccia, while of 267 worked flints only 8 were met with in the cave-earth. The ruder implements were thus evidently the older, corresponding in general form with those assigned by De Mortillet to "the age of Moustier and St. Acheul," represented in England by the ruder implements of the lower breccia in Kent's Hole. The newer or flint series includes some highly-finished implements, such as are referred by De Mortillet to "the age of Solutré," and are found in England in the cave-earth of Kent's Hole and Wookey Hole. The discovery of these implements considerably extends the range of the Palæolithic hunters to the north and west, and at the same time establishes a direct relation in point of time between the ruder types of implements below and the more highly-finished ones above.

NOTES AND QUERIES.

The British Museum.—Would you kindly allow me a small space to call attention to a subject of great importance to such of your readers as are dwellers in London? I refer to the hours of closing the British Museum, and speak on behalf of working men who, wishing to take up the study of Natural Science, and lacking the means wherewith to purchase costly works upon the subject, in order to become acquainted with the varied and beautiful forms of the animal kingdom. They usually leave their employment on the Saturday afternoon at two o'clock. The class of workman that would visit the Museum for purposes of study would desire to go clean and well-dressed. If so, he cannot arrive there before four o'clock. If this happen between the beginning of November and the end of February, he will have to return without entering the Museum; if in March, April, September, or October, he may stay till five o'clock, but this hour is of very little use to him. "But," I shall be answered, "from May to August it is open on Saturday until eight o'clock." True, but during that period naturalists wish to pursue their studies in the field, where they can gain more knowledge in a day than the Museum could afford in a month. It is in the winter that we wish chiefly to visit the Museum, in order to determine the species and place of our summer's captures. I would suggest, to remedy this evil, that the Field Clubs, Natural History Societies, &c., in the metropolis should send a memorial to the trustees of the British Museum, praying that it may be open to the public, like South Kensington Museum, from ten a.m. to ten p.m. Hoping that the importance of the subject will be deemed excuse sufficient for thus intruding on your space.—*Edward Step, St. Mary Lambeth Field Club.*

House Cricket.—In answer to Mr. J. P. Blackett's query regarding the manner in which the chirruping sound is produced by the House Cricket, he will find that it is made by the apparatus consisting of the tympanum or drum, which is a space on each of the upper wings, scarcely traversed by veins, but bounded externally by a large dark vein, with three or four longitudinal ridges; and of the file or bow which is a transverse horny ridge in front of the tympanum, having numerous teeth; the sound is produced by the rubbing of the two bows across each other, the tympanum acting as a sound-board. I shall be pleased to show Mr. Blackett nature's violin, if he feels inclined to pay me a visit.—*B. W. Priest.*

Fritillaria meleagris, inquired for in last Science-Gossip, was found by me five years ago in large quantities in the woods surrounding Warley Lodge, Brentwood, Essex. *Nettle-thread,* viz., a stuff made of nettle-thread, was bought by me two years ago in Offenbach, Landau, Germany. —*Blanche.*

Fritillary.—Your correspondent Joseph Anderson, jun., Chichester, asks for the habitat of *Fritillaria meleagris.* I know of one place where it grows, viz. on the borders of three counties, Hampshire, Surrey, and Sussex; I mean at the point where these three counties converge near Haslemere. I will try and get a specimen if your correspondent will send his full address.—*T. W.*

[This plant is now growing so abundantly in some of the Suffolk meadows as to be a complete pest.—Ed. *S.-G.*]

Heronries.—I think that Mr. Arnold, whose query respecting Sussex heronries appeared in Science-Gossip for April, would be interested to hear of two large and old-established colonies near Hastings. The one, said to be one of the largest in England, is at Brede, north of Fairlight, situated in a small lonely wood, near Broad Oak. The other is at Windmill Hill, near Hurst-Monceaux, where the heronry is accompanied by a large rookery. The two, rook and heron, occasionally nesting in the same tree.—*St. T. H.*

Brown Toads.—In answer to J. H. B. Brooke, I have in my possession a fine toad of a light red-brown colour. I obtained it about two years since on Wimbledon Common. It is the only one I have seen of so ruddy a hue, but I have got specimens of various tints from dirty brown to dark grey. These latter tints harmonize beautifully with the soils upon which they are most commonly found, and it might be worth the trouble to ascertain if the hue of these brown and red toads is not dependent in some way on the hue of their native soil. I obtained my red toad from a gravel-pit.—*E. Step.*

Early Appearance of Swallows.—It is rather an unusual circumstance to see swallows in London, or in the London parks. On Good Friday, April 16th, after the snow-storm, and when there was an intensely cold north wind blowing, I observed from fifteen to twenty swallows flying backwards and forwards over the Serpentine. They were evidently in search of food, of which I fear they found but little. I looked for them since, but none appeared for some time afterwards.—*T. E.*

NOTICES TO CORRESPONDENTS.

Notes on the Diptera.—Erratum.—In the fifth line from the bottom of page 103, for the second "transverse" read "transparent." Thus: "Its wings are dark brown, with three transverse bands of transparent spots," &c.

J. H. Bloom.—There is no book on the British Diptera that we are acquainted with corresponding to Wood's shilling series. There would be no "market" for the issue of such works at present. Perhaps some of our readers will answer Mr. Bloom's query as to whether there is any method of preserving the eggs of reptiles.

A. H. Searles.—Bell's "British Reptiles" is published at (we think) 12s. by Van Voorst, London. We do not know of any work on the Jersey Lizard. The latter, we imagine, must be the *Lacerta viridis*, or one of its many varieties, as this is so common on the Continent, and not infrequent on the southern coasts of England. In answer to your last query, get Professor Nicholson's "Advanced Text-book of Zoology."

W. T. E.—There is no examination required for admission to the Linnean Society. You must be proposed by three Fellows "from a knowledge of your works or writings," and then be balloted for.

R. J. R.—You will find all you ask for in the second edition of Taylor's "Half-hours in the Green Lanes." London: Hardwicke & Bogue.

Nemo.—Consult Mrs. Lankester's "Wildflowers Worth Notice." It is just the book for you. Masters's "Botany for Beginners" is one that will give you the idea you seek as to structural botany.

James Whitton.—The zoophytes are very common forms, such as you may name for yourself if you get Landsborough's "British Zoophytes." No. 1 is *Sertularia abietina*, No. 2 *Sertularia operculata*, and No. 3 *Sertularia falcata*.

Query.—The specimens sent are:—1. *Carex paludosa*, 2. *C. teretiuscula*, var. *genuina*.

W. L. W. E.—The egg is that of the Missel Thrush (*Turdus viscivora*).

R. O. M.—The plants sent are:—No. 1. *Valerianella olitoria*, or Common Lamb's Lettuce; 2. *Erodium cicutarium*, or Stork's-bill; 3. *Asperula odorata*, or Common Woodruff; 4. *Iris fœtidissima*, or Stinking Iris; and 5. *Draba verna* (in flower).

G. R. Redgrave.—The specimen of wallflower sent is very singular, and we don't remember having noticed such a kind of malformation before. It is due to the suppression of the petals in some of the flowers, and a partial suppression of the sepals in others. Some of the sepals have evidently been converted into leaves (*phyllody*).

Fritillaria Meleagris.—This plant occurs abundantly on the Kennet, above Reading, the white variety being there almost as common as the red. It was found sparingly on the Mole by the Epsom College Natural History Society some years ago. It is abundant in the "Lammas Meads," at Oaksey, near Cirencester, Gloucestershire, on the Swill Brook, another tributary of the Thames; but here the white form is less abundant.—*G. S. Boulger.*

Leucojum æstivum.—H. E. Wilkinson will find the habitat of *Leucojum æstivum* described in the *Phytologist* for October, 1860.—T. W.

A. C.—Your insect is the male of the common Cuckoo-bee (*Melecta armata*). It is parasitic on that stout black bee which looks like a small bumble-bee, with reddish-yellow hind legs, and is commonly found at the red nettle during April and May. The female stings sharply.—J. B. B.

R. R. R. (Birmingham).—From the tiny fragment you inclose, it is difficult to decide with any degree of certainty: still we believe you will find the supposed willow to be the Balsam Poplar (*Populus balsamifera*), a tree which answers to your accurate description, and which yields a rich balsamic perfume, especially in the evening. It is also most conspicuous when the buds are expanding.

J. W. B. (Liverpool).—Your zoophytes are as follows:—No. 1, *Sertularia lendigera*; No. 2, *Plumularia cristata*; No. 3, *Sertularia pumila*; No. 4, *Sertularia abietina*; Nos. 5 and 8, *Sertularia argentea*; No. 6, *Plumularia falcata*; No. 7, *Plumularia falcata* covered with *Membranipora pilosa*.

The Microscope.—By an oversight, in our notice of Mr. Phin's excellent little work, published in America, on the Microscope, we spoke of it as "Half-hours with the Microscope." This title belongs to the book written by the late Dr. Lankester, and the last edition of which had an extra chapter on "Polarization," by Mr. F. Kitton, of Norwich. We are sorry we gave a wrong title to Mr. Phin's book, as it made it appear as if he were using Dr Lankester's, when such was not the case. The full title of Mr Phin's work was "Practical Hints on the Use of the Microscope." We gladly make this voluntary confession because Mr. Phin's little manual is too good to be supposed to sail under false colours.

F. H. C.—Your moss is *Aulacomnium androgynum* (young).

B. C. L.—You had best apply to John Tym, Castleton, Derbyshire, who has long studied the geology and mineralogy of the district, and has an excellent museum, where nearly all the catalogued fossils may be obtained.

M. W.—Your specimens are,—1 and 10, *Weissia verticillata*; 2, *Grimmia trichophylla*; 3, *Hyp. molluscum*, var. *croceum?* 4, *Fissidens adiantoides*; 5, *Bryum pseudotriquetrum*; 6, *Hyp. molluscum*; 7, *Hyp. cupressiforme*, var. *ericetorum*; 8, *Campylopus polytrichoides*; 9, *Trichostomum mutabile*.

M. S.—Your mosses are:—1, *Tortula unguiculata*; 2 and 4, *Funaria hygrometrica*; 5, *Tortula lævipila*; 3, *Hyp. rutabulum*; 6, *Bryum carneum*; 7, *Bryum alpinum*; 8, *Hyp. serpens*; 10, *Aulacomnium androgynum*; 11, *Hyp. sylvaticum*; 12, *Campylopus flexuosus*.—*R. B.*

EXCHANGES.

Duplicates.—*Machaon* and *Carpini*, *discrata*, *Versicolor*, *Quercifolia*, *Fagi*, *Dispar*, *Ocellatus*, *Porcellus*, *Elpenor*, and many others.—H. Wiglesworth, Chilton Lodge, Rotherham.

Wanted, Stone Implements of Europe, in exchange for similar specimens of America.—Address, A. F. Berlin, Reading, Pennsylvania, U. S. A.

Eggs of Kingfisher, Water-rail, Starling, Moor-fowl, Corncrake, and others. Lists exchanged. What offers?—W. J. Houston, Cullybackey, co. Antrim, Ireland.

Muscari *racemosum* and other Cambridgeshire Plants offered for Rare Plants of other counties.—H. L. J., Caius College, Cambridge.

For Slide of Arborescent Silver send a Well-mounted Object to W. A. Hyslop, 22, Palmerston-place, Edinburgh.

Silene *italica*, Pers., for any of the following Nos. Lon. Cat.:—106, 293, 349, 389, 457, 472, 623, 710, 971, 1,035, 1,089, 1,121, 1,247, 1,312, 1,484, 1,632.—A. B., 107, High-street, Croydon.

I have Larvæ of Fascelline for exchange, and am open to offers.—20, Bedford-street, Unthanks-road, Norwich.

Conchology.—*Zonites radiatulus*, var. *viridiscentia-alba*, for *Limnæa stagnalis*, var. *albida*, or good *Vertigos*.—Lister Peace, Hebble-terrace, Bradford-road, Huddersfield.

A first-class No. 2 Eye-piece in exchange for a good Section-cutter, or a firm double or triple Object-glass Nosepiece, or equivalent in Good Objects.—H.G., 45, St. George's-road, Peckham.

Mosses.—*Anomodon viticulosum*, *Bartramia ithyphylla* (both in fruit), &c., are offered in exchange for any Rare Moss, by E. J., 24, Queen-street, Ulverston, Lancashire.

For specimens of *Puccinia Smyrnii* on "Alexanders," send stamped envelope to J. H. A. Jenner, 4, East-street, Lewes. No exchange required, but other Micro-fungi acceptable.

BOOKS, &c., RECEIVED.

"Lankester's Practical Physiology." Sixth Edition. London: Hardwicke & Bogue.

"Food Chart." By R. Locke Johnston. London: Hardwicke & Bogue.

"Monthly Microscopical Journal." May.

"Ben Brierley's Journal." May.

"Land and Water." May.

"Journal of Applied Science." May.

"Potter's American Journal." April.

"American Naturalist." April.

"Canadian Entomologist." April.

"The Laboratory." April.

"Boston Journal of Chemistry." April.

"Chambers's Journal." May.

"Journal of West Riding Consolidated Naturalists' Society."

"The Argonaut." May.

Communications up to 8th ult. Received from:—F. K.—J. N.—E. E.—W. H. P.—H. G. G.—J. L. C.—A. G. W.—J. R. S. C.—F. A A.—H. L.—W. K. B.—T. E.—J. J. R.—G. C. D—C. W.—W. V. A.—A. H. B.—C. F.—S. H.—R. G.—A. D.—J. H. G.—T. S. C.—R. N. V.—T. P.—R. M. D. P.—S. M. P.—A. J. A.—W. J.—J. E. S.—C. D.—L. P.—J. C.—H. T.—T. L. B.—R. S. T.—T. B.—H. E. P.—T. E.—J. H. B.—J. P.—W. G. P.—E. L.—J. B.—P. F.—H. G. G.—S. W. C.—W. H. N.—A. F. B.—E. S.—M. B. A.—J. G. H.—G. W., jun.—F. J. A.—M. S.—F. H. C.—R. J. S.—H. M. J. U.—J. B.—H. L.—H. W.—H. J. T.—R. R. R.—Dr. E. T. N.—W. A. H.—T. W.—C. W.—J. R. R.—H. L. J.—C. W. W.—E. E.—A. C.—S. J. B.—G. C. D.—A. J. J. B.—W. J. H.—I. L. B.—W. T. E.—R. G.—T. B. W.—Dr. C. C. A.—J. H. B.—R. N. V.—W. G. P.—J. W. B.—F. J. A—F. B.—T. G. B—J. B.—R. C.—F. H. A.—J. H. A. J.—G. S. B.—E. D. M.—A. E.—G. S—E. J.—A C.—H. G.—A. E. O.—M. W.—L. P.—H. L.—A. B.—W. L. W. E.—J. P. S.—A. H. S.—R. R. R.—J. R. R.—F. H. C.—Dr. T. O. W.—Dr. E. T. N.—W. T. E. &c. &c.

HOW TO CUT SECTIONS OF ALGÆ.

By Mrs. MERRIFIELD, BRIGHTON.

I HAVE been asked how to cut sections of algæ, and thinking that some of your readers may also like to know how to perform this simple operation, so indispensable to the students of algæ, I beg to send the following communication on the subject for insertion in SCIENCE-GOSSIP.

MATERIALS. 1. Some pieces of clear glass, about 3 inches by 1 or 1½ inch.

2. A piece of thin, smooth cork, about 2 inches diameter: a good smooth bung will do.

3. A piece of white cardboard (not glazed), about 2 inches by 1½ or 2 inches, with square corners.

4. Two pointed instruments for arranging the sections, &c. Convenient tools for this purpose are made by inserting the heads of large needles into the pith of pieces of elder, about 4 inches long, and as thick as a lead pencil. When dry, the elder twigs form good handles.

5. A pair of fine-pointed scissors.

6. A cutting instrument. Dr. Harvey recommended for this purpose a razor set in a firm handle, so as not to close; or, a child's gum-lancet, also set in a firm handle. The razor may do for cutting sections of laminaria, &c., but I found it very clumsy for small weeds. I obtained from a cutler, to whom I explained what I wanted, a very thin knife-blade, about the size of a penknife, set in a firm handle, with a sheath to protect it when not in use. This answers the purpose very well. Cost 1s. 6d.

7. A few "Naturalist's pockets" of paper, for putting away small scraps of algæ, which you wish to preserve.

8. A good drawing-pencil, and india-rubber.

9. Some pieces of white paper to make enlarged drawings of sections, small branches, fruit, &c.

10. Some oblong pieces of clear talc, on which specimens of fruit and small branchlets may be preserved for after-examination by the microscope.

11. A small bottle with glass stopper, containing dilute muriatic acid.

12. The stick of a lucifer match.

13. A moderate-sized hair pencil; some pieces of rag.

14. A box to hold all these objects.

15. A glass of clean water.

To make a cross-section of an alga:—If you can get fresh plants from which to cut sections, so much the better. They must not, however, be too wet, for in this case the pressure of the knife would crush them, so that you could not cut a clean section, or understand the structure. If the plant to be examined be wet, cut off a convenient piece, and lay it in a cloth, when it will soon be dry enough for the purpose. Select for cutting a portion which is a fair sample of the plant, bearing in mind that the lower parts of the stem are often of denser structure than the upper. For this reason it is sometimes necessary to make cuttings from both upper and lower branches across the frond. A piece of the plant about the fourth of an inch in length will be enough. If the plant from which you are cutting be too dry, the sections will scatter away and be lost. To avoid this, wet the fragment, and let it dry sufficiently in a cloth. When it is ready, place the cardboard on the cork, and the piece of alga on the cardboard, the surface of which is yielding, and not so likely to blunt the knife as the harder surfaces of wood or metal, and being white, you can see the sections as they are cut. Bring forward the forefinger of the left hand, lay your nail on the alga, so that you can *only just* see the edge of it beyond your nail. Then take the

thin knife, lay the blade against your finger-nail, and cut gently and cautiously down to the paste-board, lest the sections should be jerked away. The thinner the slices are cut, the better. They cannot be too thin. It is better to cut eight or ten slices, because they afford more scope for observation, and it is as easy to cut a dozen as to cut one, by moving the finger-nail gently backward between each cutting.

If great care be not taken in cutting the sections, the central part, often of very lax texture, may be torn, or even displaced, so that the frond appears to be hollow. This appearance is always to be distrusted. And now will be found the advantage of having cut many sections. Close observation of all these will seldom fail to discover, not only traces of the central stratum, but probably a good section of it, from which the structure of the frond may be ascertained. If all the sections fail in showing the central stratum in perfect condition, other sections must be cut until this object is attained. A little practice will render this operation easy.

When you have cut as many sections as you wish, tilt the cardboard gently on to one of the pieces of glass, using the knife or needle to remove the sections if necessary. Add a *small* drop of water. If you put too much water, the pieces of alga will float about. Superfluous water may be removed with a piece of rag or dry hair pencil. Perhaps it may be found more convenient to put the water on the glass, and then remove the sections on to the wet part of the glass; they are then less likely to scatter and be lost. Place the glass on the field of the microscope, not using too high a power, as you require a large field. The needles may now be useful to place the sections conveniently near together, or to turn them into a horizontal position, as they are very apt to lie on their edges. It is very beautiful to see the sections expand, which they do in some algæ more quickly than in others. Some require a few minutes only for this purpose, others an hour or two. In the latter case, put a watch-glass or inverted wine-glass over the sections (having previously removed the glass on which they are from the microscope), to prevent evaporation. If the sections do not open properly, add a drop of the muriatic acid, which will generally cause the sections to open, though it will deprive them of colour. The best way to apply the acid, is to dip the end of the stick of the match into the bottle, so as to take up a very small quantity only. Then cork the bottle carefully. If you use the microscope in a sloping position, the sections with the water and acid should be placed on a glass with a hollow sunk in it, to avoid injuring the brass work of the microscope. It is generally an advantage to place another glass on that which holds the sections.

Longitudinal sections of small plants are more difficult to make than *transverse* sections. The best plan, as the late Mrs. Gatty used to say, is to choose a forked branch, that you may have something to hold. Sometimes an *oblique* section will be easier to hold and cut than a longitudinal one.

Of *fruit*, when large enough, sections may be cut both horizontally and vertically. When making a vertical section of the fruit, the best plan is, to cut through the frond as well as the fruit. It will then be seen exactly how one part is attached to the other. In many cases it is preferable, instead of cutting sections, or in addition to so doing, to press the fruit gently between two pieces of glass, and you will then see the structure of the receptacle, and the shape of the spores and tetraspores which exude under the pressure.

Having completed your examination of the sections and fruit, you should now make careful drawings of both. These drawings should be put away with the specimens. They will be useful not only in identifying the plant, but also for future reference.

It may be as well to mention, before I conclude, that I have tried an instrument used by microscopists for cutting sections, and found it not nearly so well adapted for algæ as the more simple plan I have just described. Patience and practice will enable you to cut clean and thin sections; but when you have accomplished this object, a greater difficulty still remains to be overcome, namely, to understand the structure which the microscope has revealed, and to refer the plant under examination to its proper order, genus, and species.

THE DOUBTFUL PLANTS OF GREAT BRITAIN.

IT has often been a matter of surprise to me, and no doubt to many besides myself, that no one has attempted to throw any light on the history of those plants which are considered doubtful natives of the British Isles. When a plant is said to have been introduced, is it impossible to discover when, where, and by whom it was first brought into Britain, so as to give some solid reason for its not being admitted into the list of our indigenous plants? How is it that no one has endeavoured to throw some light on this disputed point? The longer such an investigation is postponed the more difficult it will be to arrive at anything like a satisfactory solution.

When we recollect that a century ago the facilities of travelling were comparatively few, that many parts of the kingdom were almost isolated, and therefore but rarely visited, it seems highly probable that plants might be flourishing in various secluded spots in our islands that no botanist ever found. In more recent days the deep cuttings of

many of our railways may bring buried seeds to the surface, which there vegetate and produce plants that were not known in that locality previously.

There is on this subject much difference of opinion among botanists, for some plants are accepted as indigenous by some, and questioned by others. That "doctors will disagree" is a proverb that no doubt will be true to the end of time, but if a plant be admitted into one of our older floras, and rejected from a more modern one, it would be more satisfactory to know the reason for such an omission.

There are not a few examples of this diversity of opinion. I will select a few from the 7th edition of the "London Catalogue," which we may suppose has been compiled with great care, and may be considered almost an authority on such doubtful matters.

Teucrium botrys is admitted as a native, in the 7th edition of the "London Catalogue," yet it was not discovered more than a generation since, and is confined, I believe to two localities, both very near each other. It is not mentioned by either Withering or Smith, and Arnott considers it doubtful. Yet another plant of this same genus, the *T. chamædrys* in this 7th edition of the "London Catalogue" is marked doubtful, and is also considered such by Smith. This plant has been known in England for a very considerable period, and is found in many different places. I gathered it last autumn on the ruined walls of Winchelsea Castle, in a solitary, barren spot, far from any house or garden; the idea of its being only a naturalized stranger appeared almost ridiculous. What are the reasons for admitting *T. botrys*, of such recent discovery, and considering an old inhabitant like *T. chamædrys* a mere interloper?

Leucojum æstivum was discovered by Curtis in the immediate vicinity of London, and one might imagine fifty reasons why it may have been introduced, yet it is admitted at once by Withering and Smith. Arnott considers it a doubtful native, but it is admitted in the 7th edition of the "London Catalogue." This plant, though extremely rare, and of comparatively recent discovery, is admitted as indigenous, almost without being challenged.

Setaria viridis is admitted as a native in the 7th edition of the "London Catalogue," whilst the *Echinochlora Crus-galli* (*Panicum* of Withering and Smith) is marked as doubtful. Arnott rejects both the genera of *Setaria* and *Panicum* from our list of native grasses. Both the *S. viridis* and *Echinochlora Crus-galli* have at different times sprung up in my garden, which some twenty years ago was a common, and I attribute their appearance to the ground having been dug deep, and consequently the seeds were brought nearer the surface.

Narcissus biflorus is admitted as indigenous both by Withering and Smith, but Arnott considers it doubtful, and also in 7th edit. "London Cat." Yet it is found in many localities, and I have gathered it in a remote and secluded part in the Isle of Wight, where I found it in great profusion, and where, judging by common sense only, it could not be otherwise than "wild."

Examples might be mentioned which would render my observations to an inordinate length. One more must suffice.

Lilium martagon finds no place in Smith, and both Withering and Arnott consider it doubtful, as also 7th edit. "Lond. Cat." Without venturing an opinion on the matter, I would just say this plant has been found near Box-hill, for a very considerable time past, not half a mile from the spot, where the newly-discovered but admitted *Teucrium botrys* grows, for I am conversant with them both. I was told a short time ago by a gentleman that he has more than once found the Martagon on an island in the river Eden, Cumberland, and also in other places in that locality. The seeds have no pappus, and could not be taken there by the wind. How did the plant get there?

Plants, not indigenous, do not, as a rule, spread extensively; they may now and then be found, but they have no tendency to perpetuate themselves. For example, when once mignonette, eschscholtzia, erysimum, and the more ordinary annuals, are once in a garden, they frequently spring up of themselves; but when do we see these plants growing by the roadside spontaneously, though nothing would seem more likely than that stray seeds should be scattered about in an inhabited district? Is it not because they are not indigenous, and do not accommodate themselves to uncultivated ground, as do our native plants? From what I have said before, it does not seem any cogent reason to suppose a flower not indigenous because Ray or Dillenius do not speak of it; not a few have been added to the list of our native plants since their time, to say nothing of unintentional omissions being made by the most accurate observers. Neither of these two great botanists mentions *Galanthus nivalis*, though it is found in such abundance and in so many places as almost to leave no room for doubt, but the recently-discovered *Leucojum* is at once admitted! These are but crude remarks, but they may tend to elicit some information on the subject from those who have investigated the matter thoroughly. H. E. Wilkinson.

A lady living at the seaside, and particularly fond of horses, will be really thankful if any gentleman will inform her of effective means to prevent horses being tormented by flies in the stable.—Address, Editor, Science-Gossip.

THE DOINGS OF A PAIR OF WATER-HENS.

ONE is so accustomed to look upon the Water-hens much as we do the thrushes and blackbirds in our gardens, that any peculiarities in them become on that account the more noticeable even to casual observers of nature; and therefore I venture to send the following facts about a pair of Water-hens which live under our own windows. In front of the house, not more than 50 yards away, is a piece of water bounded on one side by, and fully exposed to, the road, and a small piece at the top of this pond is fenced off with wire netting. For some two or three years Water-hens have been seen here, and this year a pair have taken possession again, and made their nest in the bank adjoining the road. For some time after making the nest, things went on very well, and the birds had undisputed possession; but, ere long, two swans which live on the same piece of water (only last year's birds) found out the nest, and seldom ceased doing all they could to annoy the Water-hen when she was sitting, by going up to the nest and trying to turn her out *vi et armis;* they were, however, outmatched, and on several occasions had to beat a retreat; sometimes the Water-hen would spring into the water and swim away, keeping just out of reach of the two swans that were following, by from time to time flying up from the water and dropping again some distance away. On several occasions the Water-hens have been heard crying out at night, and what was attributed to the fox, we suppose was nothing more than a "row" between the swans and Water-hens, in which the latter always came off scatheless, for the morning found them none the worse. In due time the eggs were hatched, and the cares of a family devolved on the two small but plucky birds, which soon found out that it was one thing to take care of a nest and eggs, but a far different duty to keep a large brood out of harm's way; so the young birds were taken through the corner of the wire fence into the part of the pond out of the reach of the swans, and another nest was made for them, where the Water-hen has been seen sitting, and from her shape the young birds were evidently being kept warm underneath her wings. This interesting family are now flourishing, and may be seen any day, or, if not seen the well-known call may frequently be heard; they are also very fond of bread, which disappears very shortly after being thrown near their new home. The birds must be now (May 26) quite three weeks old, and by the appearance of a new nest in another part of the pond, quite open to the attacks of the swans, the Water-hens seem to be not the least daunted by their experience; but, perhaps, they

Fig. 80. Water or Moor Hen (*Gallinula chloropus*).

rely on the assistance of the first brood to lighten their cares when some new brothers and sisters appear. H. H. C.

A GOSSIP ABOUT NEW BOOKS.

THE dulness of the last few months of the publishing season has been relieved by the issue of a two-volumed work which cannot fail to mark an epoch in the rapid progress of Natural History. No other living man than the author was so fit for the difficult task he has so admirably attempted. And, although there are weak places in the work, where the hypothesis seems scantily supported by facts, we must remember that in an undertaking of this kind, extending over such a wide area, such a liability is certain. We allude to "The Geographical Distribution of Animals," by Alfred Russel Wallace (London: Macmillan & Co.). This well-known author, famous for hitting upon the theory of Natural Selection at the same time as Darwin, and honoured for the chivalric way in which he withdrew his claim to priority in favour of that great naturalist, has here given us the most important work of his life. The amount of research contained in the two bulky volumes before us is as marvellous as the methodical clearness with which the material is arranged. The present distribution of animals—one of the most fascinating of the many collateral branches of natural history—is here considered in relation to both living and extinct faunas, so as to elucidate the past geological changes which have been rung over the earth's surface. The work is illustrated by numerous specially-composed maps, and also by many admirable full-page plates, showing characteristic groups of living animals, set in a framework of equally characteristic scenery. The main idea of the present book was hinted at by the author sixteen years ago. What he then did for the Malayan Archipelago he has now attempted for the whole earth. As one reads chapter after chapter, and perceives how the organic changes, which have differentiated animals into species, have been frequently accompanied by physical, geographical, or climatal changes in the surroundings, we cannot but be impressed with the magnitude of the modern views which the new school of natural history and geology has given to the world. With Mr. Wallace's style of writing, those who have read his "Malayan Archipelago" will be acquainted; and no more can be said in praise of the literary composition of the present work than that it is equally attractive with the former. There is a quiet earnestness pervading every page, which does not allow of a single wasted or empty sentence. It is indeed a grand book; and although we are somewhat disappointed the author has not said anything about the distribution of Man, perhaps the large space which that alone would have required rendered it impossible.

The second edition of "Animals and Plants under Domestication," by Charles Darwin (London: John Murray), has just made its appearance in two volumes, uniform in size and appearance with the recent works of this distinguished author. Here is placed on record such a carefully-arranged cyclopædia of facts relating to natural and artificial selection, that no man can be said to be even acquainted with the Darwinian theory who has not read this work. In this edition a good many additional facts are recorded, so that this important book is now of greater use than ever as a work of reference.

"Geology for Students and General Readers," by Professor A. H. Green (London: Daldy, Isbister, & Co.), is one of the most original and generally exhaustive in treatment of any manual that has been issued for many years past. The present volume only deals with Physical Geology, which, however, fills up a large book. We are sorry the author thought it necessary to give an outline of mineralogy, as it could only be done in a very sketchy and unsatisfactory manner, and ought now to be discussed, on the principle of "division of labour," as subject-matter for a separate work. Professor Green's illustrations and diagrams are nearly all original, and are very effective, notably that on "How a mountain-chain is *not* formed." No other geological work so thoroughly treats on atmospherical denudation. The portion of the work devoted to volcanoes is too brief, and ought to be expanded. For a student who wishes to be something more than a book geologist, who wants to be able to interpret natural phenomena for himself, this is just the book to study.

"The Rudiments of Geology," by Samuel Sharp, F.G.S., &c. (London: Edward Stanford & Co.), is a well-printed, nicely got-up little manual on elementary geology, which we can conscientiously recommend for its trustworthy and well-arranged material.——"Physical Geography," by W. D. Cooley (London: Dulau & Co.), is a large and important book, in which the author treats the subject from a point of view not usually discussed. Physical geography is too often regarded as an adjunct to, or even department of, geology; but Mr. Cooley studies it as the department of science which embraces the course of physics reigning on the earth's surface, and of which geography is a function. The various chapters are fully worked out, and the student will here find many subjects exhaustively treated, about which it would be difficult to find general authorities elsewhere. The astronomical relations of the earth come in for their full share of description, and the physics of the sea and air, as well as the magnetic and electric phenomena which affect our planet, are very ably and carefully worked out. We

think the author should have been more intimately acquainted with geology; and then he would have been preserved from several scientific heresies, such as those contained in the last chapter, as to the original non-liquidity of the earth, denudation, and particularly as to volcanic action, about which the little that is said is mostly wrong.

Here is a singular book—"A Critical Examination of some of the principal Arguments for and against Darwinism," by James Maclaren, M.A. (London: Edward Bumpus). The author is a barrister, and avows himself a non-scientific man (a *needless* avowal), who endeavours to "state a case." We must say that he has done so with more than usual legal cleverness, and this rather large book would, indeed, have been a valuable contribution to the literature of Darwinism, if the author had only understood his subject! We will give an example of the manner in which the important question of evolution is here discussed. "Mr. Herbert Spencer says that organic matter is built up of molecules so extremely mobile that the slightest variation in their surrounding conditions destroys their equilibrium and causes them to assume altered structures; and he refers to the effects of heat and light, and more especially of chemical affinity as shown in the process of animal nutrition and fermentation." Then follows a quotation from Herbert Spencer, in which that author shows how *nitrogenous* compounds are extremely unstable (dynamite, for instance), and explode on the slightest incentive, and that it is in those parts of the bodies of animals which are nitrogenous that all the active functions are carried on, whilst the fatty parts are inert. Mr. Maclaren then pronounces on these well-known facts as follows:—"The variations which Mr. Darwin has taught us to look for in organisms are apparently very different from explosions (!), or from anything like sudden movements, which would seem to be the natural mode of action of these nitrogenous compounds." After this general style of review, we hardly need say that Mr. Maclaren sums up *against* Darwinism!

The welcome volumes of the "International Series" still continue to be issued. Among the most recent is that "On Fermentation," by P. Schützenberger (London: H. S. King & Co.). This is unquestionably one of the ablest of the series. It is an admirable digest of all that is at present known on the subject. In addition to the researches of Liebig, and the German school of chemists, it gives a full account of the discoveries of Pasteur. Altogether, we regard it as one of the most comprehensive works of its kind in our language.——"The Five Senses of Man," by Julius Bernstein (London: H. S. King & Co.), is the last issued, and fully sustains the general character of the "Library." The student will find here all the newest and most important facts and deductions, with reference to the organs of the "five senses." The illustrations are numerous and good, and the literary style of treatment in both the above volumes of an excellent kind.

"Sketches of British Insects" by the Rev. W. Houghton (London: Groombridge & Sons), is a capitally-written and attractively got-up book, by a well-known writer. The coloured illustrations are much better executed than usual, and as the style is very cheerful and extremely interesting, this little volume would form a charming gift-book, for the young especially. Equally well got-up is "The Dwellers in our Gardens," by Sara Wood (London: Groombridge & Sons). The title will give a good idea of the subject-matter, which we are glad to say is both accurate and well written. The woodcuts and coloured illustrations give to the pages a very attractive appearance.

"Myths and Songs from the South Pacific," by the Rev. W. W. Gill, B.A. (London: H. S. King & Co.), is not occupied with a subject we usually discuss in these columns. But it is not without its scientific value, for the author, as a missionary, has diligently collected the myths, songs, and traditions of the various Polynesian tribes among whom he has lived, and which will soon be forgotten. Many of these are strangely suggestive, on account of their similarity to myths and traditions of the old world. This work is really valuable to the philologist and ethnologist, and the praise which the author has universally received for its production is well and truly deserved.

The "Food Chart," by R. Locke Johnson (London: Hardwicke & Bogue), is a most valuable and compendious production, which ought to be conspicuously placed in every public institution. It gives the names, classification, composition, alimentary value, rates of digestibility, adulterations, tests, &c., of all the alimentary substances in general use, as well as the composition and analysis of all animal and vegetable substances used as food. The "list of adulterations" in the food and condiments we eat is a compliment to our powers of digestion, and the hardihood with which we can stand wholesale and determinate poisoning. The chart is folded, so as to be placed on the shelves of the library as a book.

THE MICROSCOPE AND MICROSCOPIC WORK.

No. VII.—By F. Kitton.

NOTHING, perhaps, brings more to mind the old saying, that "familiarity breeds contempt," than the perusal of the writings of the early microscopic observers. Objects which the modern "Microscopist" thinks scarcely worth a passing glance, were viewed with rapturous delight by Leeuwenhoek, Baker, and others. The microscope

had opened to their view a new world, the zoology and botany of which they were never tired of exploring.

Baker's second part of the "Employment for the Microscope" treats on the various minute forms of animal and vegetable life, and he is much struck with their beauty of form and elegance of "workmanship." He says in his Introduction that "Though everything is *alike easy* to an Infinite and Almighty BEING, yet, according to human Comprehension, it appears wonderful that we find almost without Exception in those *Specks of Life*, whose Minuteness renders them almost imperceptible to the Eye of Man a greater Number of Members to be put in Motion, more Wheels and Pullies to be kept going, a greater Variety of Machinery, an Apparatus more Complex and Curious, a Plan seemingly of deeper Contrivance, in short more Elegance and *Workmanship* (if the Term may be excused) in the Composition, more Beauty and Ornament in the Finishing, than are seen in the enormous Bulk of the Elephant, the Crocodile, and the Whale, compared with which, one would think them no less the Effect of a more exquisite and superior Art than the Movements of a Watch appear to be on Comparison with the Wheels of a Coach or Waggon. These Truths need no Proof to such as are acquainted with the MICROSCOPE, however incredible they may seem to others."

Baker, in common with other observers, concluded that those minute forms of life possessed a more complex organization than those which we now call the higher forms of life. This error was pardonable, as nothing was known of the minute structure of the larger plants and animals; he is more correct in his supposition that though "GLASSES discover to us numberless Kinds of living Creatures whose Minuteness renders them absolutely undiscernible by our naked Eyes, and God alone knows how many thousand kinds there may be, still decreasing in Size, which it is impossible for us to see by any Help whatever. . . . The smallest living Creatures our Instruments can show are those that inhabit the Waters, for though possibly Animalcules no less minute may fly in the Air, or creep upon the Earth, it is scarce possible to bring such to our Examination. . . . And As *Names* are of the utmost Service to make People understand each other, I hope to be indulged the Liberty of giving such to these hitherto unnoticed Animalcules, as correspond in some manner to their Appearance, even though I may not always have chosen the most proper."

But, unlike the gardener of Crabbe, he does not call them by high-sounding names:—

> "High-sounding words our worthy gardener gets,
> And at his club to wondering swains repeats:
> He then of *Rhus* and Rhododendron speaks,
> And *Allium* calls his onions and his leeks.
> Where Cuckoo-pints and Dandelions sprung
> (Gross names had they our plainer sires among),
> There *Arums*, there *Leontodons* we view,
> And *Artemisia* grows where Wormwood grew."

The first chapter is devoted to the description "Of the HAIR-LIKE Insect":—

"The wonderful Animalcule I am going to describe was, I believe, first taken Notice of by my curious Friend, Mr. William Arderon, of the City of *Norwich*,* who kindly sent me an Account thereof, together with many thousands of the Creatures themselves, which came to me alive in a Vessel of the same Water they were found in, and lived with me several weeks.

"This little Animal is extremely slender, and not uncommonly one hundred and fifty times longer than broad. Its Resemblance to an Hair has induced me to call it the *Hair-like Insect.* The Body or Middle Part which is nearly strait in some is composed of such parallel Rings as the Windpipe of Land Animals consists of, but seems in others scaled or rather made up of Rings that obliquely cross each other. Its two Ends are bent or hooked pretty nearly in the same Degree, but in a Direction contrary to each other, and as no Eyes can be discerned, 'tis difficult to judge which is the Head or Tail. Its progressive Motion differs from that of all Animals besides hitherto described, for notwithstanding the Body is composed of many Rings and Joints, it seems unable to bend at all, or move directly forwards, but when it is inclinable to change its Quarters it can move from Right to Left, or Left to Right, and proceed at the same time backwards and forwards obliquely. It has neither Feet, nor Fins, nor Hairs, but appear perfectly smooth and transparent, with the Head bending one way, and the Tail another, so as to be like a long Italian *ſ*, nor is any internal Motion or particularly opake Part to be perceived which may determine one to suppose it the Stomach or other of the Intestines.

"These Creatures are so small that Millions of Millions might be contained in an Inch Square. They are exceedingly transparent, and of a lively green, but when numbers are brought together they become opake, and lose their green Colour in pro-

* William Arderon was not a native of Norwich, but came from Yorkshire in the capacity of an officer of excise; his natural ability soon discovered itself, and introduced him to several Norwich *savans*, who, it is supposed, in order to retain amongst them so valuable an auxiliary in their pursuits obtained for him the situation of managing clerk at the "New Mills"; through these gentlemen he was introduced to Mr. Baker: he was the author of numerous papers on "Natural History," many of which will be found in the Transactions of the Royal Society. The late Dawson Turner, of Yarmouth (who was in possession of his correspondence with Mr. Baker), considered him a remarkable man, and, considering the difficulties he had to struggle with, certainly superior to Gilbert White, of Selborne. He died on the 25th of November, 1767, after a long and painful illness, in the sixty-eighth year of his age.

portion as the Quantity increases, till at last they appear entirely black.

"They were first discovered in a Ditch at *Norwich.* The length of the Ditch is at least an hundred yards, and its Breadth nine, the Bottom for more than a Foot in Depth is covered with a blackish green substance in Appearance like Mud, made up wholly of these and other Insects."

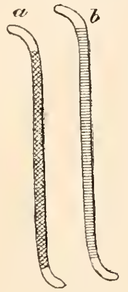

Fig. 81. *a*, *b*, Arderon's "Hair-like Insects."

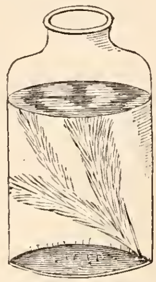

Fig. 82. Glass jar containing "Hair-like Insect."

Our "ingenious Friend" Mr. Arderon placed a large spoonful of this dark green matter into a glass jar, which he filled with water, and the next day when he came to examine what had happened amongst these "Myriads of little Animals, he found that a Multitude of them had as it were by Agreement place themselves on the Side of the Jar, and appeared marching upward in Rows . . . . A small quantity of this Matter having one day been put into a Jar of Water it so happened that one part thereof went down immediately to the Bottom, whilst the other Part continued floating upon the Top. All Things remained a good while in this condition, until at last each of these Swarms of Animalcules grew weary of its Situation, and had a Mind to change its Quarters. Both Armies in Short began their March at the same time against the side of the Jar, and as one proceeded upwards and the other downwards, after some Hours they were near meeting about Midway . . . . The Desire of knowing in what manner they would behave on this Occasion, engaged the Observer to watch them with a careful Eye, and as they approached still nearer he beheld to his great Surprize the Army that was marching upwards open to the Right and Left, and leave a convenient Space for the Army that was marching downwards to pass between its Wings. Thus without Confusion or Intermixture each held on its Way."

The writer proceeds to express his admiration of the sagacity of these creatures, which enabled them to act unanimously for the benefit of the community.

The reader will probably have been able from the above description to identify this "*Hair-like Insect*" with what we now know as one of the commonest of the freshwater Algæ, *Oscillatoria nigra* or *limosa;* the sigmoid form of the filaments, however, does not agree with those of oscillatoria, and we can only suppose that Baker was mistaken in this respect: his friend Arderon says nothing of their shape excepting that they were hair-like, and he had mistaken them at first for the roots of some water-plant.

Oat Animals.—The identification of this form is by no means so easy as that of the one just described; it was found in the same ditch-water from Norwich as the preceding, and seems to have been first detected by Mr. Arderon. The following is Baker's description:—"This Creature is so very small that no true Judgment can be made of it unless it be looked at through the greater magnifier, nor even then without considerable attention. I commonly found two or three of them in a Drop of the Sediment amongst Multitudes of the *Hair-like Insect* lying at the bottom of the water without any visible Motion or Appearance of Life: being enclosed in a Bivalve-shell which the animal can open or shut as it is inclined, but which constantly shuts upon being disturbed, nor opens again until after having been quiet for some time. . . . The two ends of the Shell can open whilst the middle Part remains closed, and in that Condition it is like the *Pholas* and some Species of the *Chama,* but differs from them in being able to shut both Ends, and alter the Figure of its Shell, which they cannot do. When these Ends are open the Creature frequently thrusts out at each a cylindrical fleshy Part (fig. 83 *c*), which may be supposed the Head and Tail, but their minuteness renders it hardly possible to discover any difference between them. In this Posture it is probable the Creature feeds on that Provision the Water brings, though it depends not on such accidence, for it can change its place by Jerks or Leaps, which it makes by the Action of some strong muscles in the two protruded parts whose Spring throws it to the distance at least of its own Shell's Length every time they are exerted. These Leaps, however, have long Intervals between, and are never made till the Animal is perfectly undisturbed."

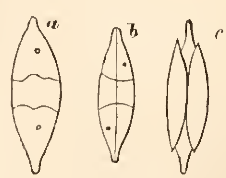

Fig. 83. "Oat Insects."

Fig. 84. "The Satyr."

This is probably some species of Navicula, and the opening and closing of the shell, and the fleshy parts, purely imaginary on the part of the describer, and if this surmise is correct it is probable that this is the first diatom ever detected.

Eels in Paste.—Viviparous.

This discovery appears to have been made by a "Mr. James Sherwood, an ingenious young Surgeon," who, whilst separating one of these small eels accidentally wounded it in the belly; he took notice that a long slender tube, doubled like an intestine, proceeded from the wound, of which, informing *Mr. Needham*, it excited their curiosity to cut in two another eel near its middle, when they discovered a number of *living young ones*, each enclosed in its proper membrane, issuing from what now plainly showed itself to be the *Uterus*. The author gives minute directions as to how the experiment is to be performed, but we will not tempt our readers to become vivisectionists, although Mr. Baker says: "I scarce know a more entertaining Experiment, and you'll very seldom be disappointed, for they seem like *Earthworms* to be all prolific, and unless by Accident you cut one that has already brought forth all its young before or make your Trials when the Paste has been kept a long time (in which case I have found them sometimes unfruitful), you will not fail of being diverted after the Manner above described." The discovery of the viviparous nature of the *Anguillæ* was not in accordance with the preconceived notion that they were the larvæ of some kind of fly that was in the habit of depositing its eggs on the paste. From the examination of the Paste Eels, he proceeded to examine those found in blighted wheat, and which he considers to be distinct from those found in paste.

One of the papers addressed to the Royal Microscopical Society, consisted of a minute description of the "Wheeler," or *Wheel Animal* (*Rotifer vulgaris*), illustrated by twelve figures, showing the Wheel Animal in its several postures. The rotation of the "Wheels" puzzled him considerably, and although some "gentlemen imagined there might be a Deception in the Case, and that they do not really turn round, though they seem to do so. The Doubt of these Gentlemen arises from the Difficulty they find in conceiving how, or in what Manner, a Wheel or any other Form, as part of a living animal, can possibly turn upon an Axis supposed to be another part of the same living animal, since the Wheel must be a Part absolutely distinct and separate from the Axis whereon it turns; and then they say how can this living Wheel be nourished, as there cannot be any Vessels of communication and the Part it goes round upon, and which it must be separate and distinct from?" Baker was not inclined to admit that the revolution of the "Wheels" was an illusion. He says:—"Place the Object in whatever Light or Manner you please, when the Wheels are fully protruded they never fail to shew all the visible Marks imaginable of a regular turning round, which I think no less difficult to account for if they do not really do so." His industrious friend, Mr. Arderon, sends him what he calls the *Bell Flower Animal*, and which was afterwards described by *Mr. Trembley*, under the name of the *Polypea Pannache* or the *Plumed Polype*; this is, doubtless, the form now known as *Alcyonella stagnorum*, and was not uncommon in the Swan pond belonging to St. Helen's Hospital in Norwich, from whence, probably, Mr. Arderon obtained his specimens.

The figure following, Mr. Baker supposes, is the true representation of this curious animacule, of which a drawing is given in our last paper (fig. 64): he says, "it is brisk and vigorous, swimming sometimes with great swiftness through the Water, at other times it creeps along at the Bottom of the Drop, and now and then skips nimbly like a Flea.

"Monsieur *Joblot* * (whose Imagination has frequently exaggerated the figures of Animalcules found in Water), tells us that he once discovered in an Infusion of the *Anemony*, an Animalcule, having on its back a Mask, or exact Representation of a *Satyr's Face*, and gives a Picture suitable to that idea. But making a considerable allowance for the Truthfulness of his, or the Painter's Fancy, I think it not unlikely that the Subject we are treating of might have been the little Animal he saw; for the two black Spots, with the part of the Bowels that comes between them, have some Resemblance of a Nose and Eyes; the two Points which terminate the Shell at the Tail-end appear something like a piqued Beard; the distance between them might pass for a Mouth; and the Whole put together might, by a true Lover of the *Wonderful*, be worked up to the extravagant Likeness of a *Satyr's Face*. But this is mentioned only, by the bye, and as a Reason why I give it the name of *Satyr*."

This animal is probably one of the Entomostraca.

In the month of July, 1745, Mr. Baker received from his correspondent, *Mr. Joseph Greenleafe*, of *Yarmouth*, three Phials containing several kinds of Animalcules which were new to him; one kind was exactly globular in form, and had no appearance of head, tail, or fins. His friend Mr. Arderon had also observed this form in a drop of Norwich water. The figure of this form is that of *Volvox globator*. As may be imagined, the luminosity of the sea attracted the attention of those who used microscopes, and the principal cause of this phenomenon was soon discovered. Mr. Baker says, "that a curious enquirer into Nature,† dwelling at Wells, upon the Coast of Norfolk, affirms from his own Observations that the Sparkling of Sea Water is occasioned by

* This is no doubt the A Y. who sent the drawing and description to the "Gentleman's Magazine."
† Mr. Joseph Sparshall.

Insects, and he sends him some specimens and a description of these Insects. Placing one of these Animalcules before a good Microscope, an exceeding minute Worm may be discovered hanging with its Tail fixed to an opake Spot in a kind of Bladder, which it has certainly the Power of contracting or distending, and thereby of being suspended at the Surface, or at any Depth it pleases in the Water." This description, although erroneous and imperfect, clearly points to the *Noctiluca miliaris.*

We have now given our readers a fair specimen of Microscopic Work in the middle of the eighteenth century; work done by men who held no mean position in the scientific world, and although some of their deductions may cause a smile, we must admit that, considering the instruments they had to work with, and that the organisms which revealed themselves to their astonished gaze were imperfectly understood, they did their work well. Everything examined by the "double microscopes," and the higher powers used at that time, were seen as "through a glass darkly," and these simple forms of life were stated to possess fins, feet, eyes, stomachs, &c., organs which existed only in the observer's imagination.

(*To be continued.*)

THE HISTORY OF CULTIVATED VEGETABLES.

No. XVIII.—The Tomato, or "Love Apple."

(*Lycopersicum esculentum.*)

The Tomato, or Love Apple, is the fruit of a herbaceous plant, having a hairy stem and rank smell; belonging to the Nightshade and Potato family, nat. or. *Solanaceæ.* It is a native of South America, whence it was early introduced by the Spaniards into Europe, and used as a vegetable. The editor of the "Bon Jardinier" (pour l'an 1818) describes the Tomato as coming originally from Mexico, but Mr. Sabine, in a paper he read on this plant, before the Horticultural Society in 1819, said that there is no authority for this statement, for though Hernandez, in his History of Mexico, mentions it, he does not particularly distinguish it as a native of that country. South America being the native country of this vegetable, it was of course unknown to the ancient Greeks and Romans; still, the name Lycopersicum is stated to have originated with Galen, the celebrated physician, who lived about A.D. 131, but it has not been ascertained to what plant it was given. The name is derived from *lykos*, a wolf, and *persicon*, a peach, implying that the fruit was of such inferior quality as to be fit only for the use of that animal. Gesner, an eminent physician and naturalist of Zurich, born in 1516, entered into some investigations of Galen's on the subject, but they did not lead to a certainty, and his opinions are criticized by John Bauhin. Anguillara, an Italian, in a work published in 1561, conjectures that the Lycopersicum of Galen was the Tomato, and on this authority it is said to have acquired in after-times the name of Lycopersicum Galeni. In the "Adversaria" of Pena and L'Obel, published in 1570, it is called *Poma amoris, Pomum aureum,* and *Lycopersicum quorundam,* in conformity with Anguillara's conjecture.

In the "Élémens de Botanique" of Tournefort, 1694, we find he adopted Lycopersicum as the name of the genus in which he placed the particular plant now treated of. Dodoens, a Dutch botanist, describes this plant as grown in his time in the Continental gardens (see his "Pemptades," published at Antwerp, 1583), and that the fruit was eaten, dressed with pepper, vinegar, and oil. It appears by the "Hortus Kewensis" to have been cultivated in England in the year 1596, but it must have been introduced some years previously to that date, as Gerard mentions it in the early part of his voluminous "Herbal" (published in 1597), which must have taken some years in compiling and printing:—"This author calls the Tomato *Pomum amoris,* and says Apples of Love do grow in Spain, Italy, and such hot countries, from whence myself have received seeds for my garden, where they do increase and prosper." He also tells us that "there hath happened unto my hands another sort very notable with the former, only the fruit thereof is of a yellow colour." Parkinson, in his "Paradiseis," published 1656, says "that the Tomato grows naturally in the hot countries of Barbary and Ethiopia, yet some report them to be first brought from Peru, a province of the West Indies. We only have them for curiosity in our gardens, and for the amorous aspect or beauty of the fruit." There is no record when this vegetable was first employed as an esculent in this country, but Miller, in his "Gardener's Dictionary," published in 1752, after describing them, says they were much used in soups in his time. Being a native of hot climates, the crop very much depends on the season in this country; when it is favourable, large quantities are produced in the open air. As far back as 1818, being a very fine summer, the growth of this vegetable round London exceeded the demand. Mr. John Wilmot, of Isleworth, states that from a crop of 600 plants that season, he gathered 400 half-sieves. The fruit on several single plants probably weighed 40 lb.; some of the apples were of an extraordinary size, exceeding 12 inches in circumference, and weighing 12 ounces each.

It is stated that this vegetable, medicinally considered, is an excellent substitute for calomel, and can be taken when that valuable medicine cannot, and with less injury to the constitution (see McIntosh's "Book of the Garden"). In France and

Italy whole fields of this plant are cultivated; so great is the demand in some parts of the latter country, that there is scarcely a dinner served up in which it does not in some way or other form a part. In England, the plant is more cultivated than formerly, and there has been of late an importation of this vegetable from the United States, preserved in tins. In a course of an extensive series of chemical experiments on plants by E. Solby, he found that the leaves and stems of the Tomato contained nitric acid. It is stated in the "Gardener's Magazine" vol. x. (1834), that Tomato buds may be grafted on potatoes, and plants thus treated produce good crops of both vegetables.

The old European botanists wrote the name of this plant Tumatle. The Spaniards and Portuguese call them Tomates, which appears to be the original Peruvian appellation; and in Mexico this and several plants of the Solanum genus are called Tomatles.

There are several varieties of Tomatoes known by the form and colour of their fruit. Duval, in his "Natural History of the Solanum," notices their distinctive characteristics, and describes each as a distinct species; but it is believed that they can all be referred to a common type, viz., the large Tomato, with deeply-divided, rough, hairy leaves and clusters of yellow flowers, succeeded by large lobed fruit of an orange red or scarlet colour when ripe. Dr. B. Seemann, in his "Flora Vitiensis," or the description of plants in the Fiji Islands, mentions *Solanum anthropophagorum* (the cannabal's Tomato), called Bogo-dina, being one of the plants which Fijians cultivate very near Bure-ni-sa, or stranger's house, where the bodies of the slain in battle are always taken to be feasted with the fruit of this plant, and from which it appears that savages sometimes require a *relish* with their disgusting food.

H. G. Glasspoole.

NOTES ON THE DIPTERA.

V.—The Asilidæ.

Since one of the objects of these papers is to call attention to certain flies just at the season when one may expect to find them, the families described are necessarily taken out of their natural position. Thus the *Asīlidæ* have but little connection with the *Muscidæ*, though they have points of resemblance to the *Bombylidæ* and *Tabanidæ*, previously described. They diverge from the ordinary types of British diptera, and the connecting links are found only in hot climates. They are the largest of all the diptera except the *Midasidæ*, and any one visiting the British Museum may obtain an idea of the largeness and ferocious appearance of some of the exotic species from a few specimens which are there exhibited.

The *Asīlidæ* may be at once recognized by their mouths, which will be presently described. Five genera occur in this country. Two of these, being uncommon, are not likely to be met with: the other three, *Asīlus*, *Leptogaster*, and *Dioctria*, may be distinguished as follows:—The feet of *Leptogaster* have no onychia (*i.e.* pads), while the other two genera have them well developed. In the wings of the genus *Asīlus* the sub-costal and radial veins unite just before meeting the margin of the wing. (See *sc* and *r*, fig. 87.) In these two genera the antennæ are small, but in the genus *Dioctria* they are unusually large, as fig. 93 will show.

The first genus, *Asīlus*, is the type genus of the family. Its finest species, *A. crabroniformis*, is much the strongest of the British diptera, and, except one or two *Tabani*, the largest. The male is fully an inch long, and the female, of which a drawing is given at fig. 85, is about one-tenth of an inch longer. The breadth across the expanded wings varies from one inch and a half to one inch and three-quarters. Though not very common, where it is to be found it often occurs in large numbers. Uncultivated tracts of land, such as mountain-sides, heaths, and forests, are its favourite haunts. It is commonly called the Great Hornet-fly, and its specific name too refers to its supposed likeness to a hornet. But the name is little applicable, for it requires a stretch of the imagination to see the resemblance. As it comes tumbling along with its lumbering flight and unmusical buzz, it looks more like a greatly overgrown dung-fly than a hornet. In richness of colouring it exceeds, not only all our other diptera, but also most of the other orders, and approaches the lepidoptera in the tone of its colour. It seems, in fact, more like a tropical than an English insect, so different is its style from that of the insects to which we are accustomed. The eyes are bronze green, and are set off by fringes of orange hair on the face and under-side of the head. The thorax is orange-brown in colour, with a dark stripe down the middle, on each side of which is a patch of silvery grey. The hinder half of it is thinly armed with long pale brown bristles. The abdomen is covered with lustrous down, finer than the finest velvet, which is of an intense black over the three basal segments, and of a rich orange-brown over the remaining six in the male; in the female the last two segments are black, and quite smooth and shiny. There are tufts of black and white hairs at the edges of the three basal segments. The legs are bright brown and very hairy. But the most uniquely coloured parts are the wings. The veins are ruddy (the paint called burnt sienna would nearly match the colour), and the membrane yellow (raw sienna), except along the hind border, where each areolet is shaded with grey.

Quite a contrast in colouring is another species, *A. æstivus*, which is a brownish-black fly clothed

with grey hairs. Its shape is similar, but it is smaller, varying from $\frac{1}{2}$ inch to $\frac{3}{4}$ inch in length. It is rather a "horrid" creature, having the strength and fierceness of *A. crabroniformis* without its beauty. Its antennæ and maxillary palpi are black, and are furnished with long black hairs. The veins of the wings are *black*, and the membrane transparent and colourless, except along the hind border,

Fig. 85. *Asilus crabroniformis*, female, × 2 diam.

where each areolet is slightly shaded with grey as in *A. crabroniformis*. *A. æstivus* chooses the same kind of localities as the previous species, but is

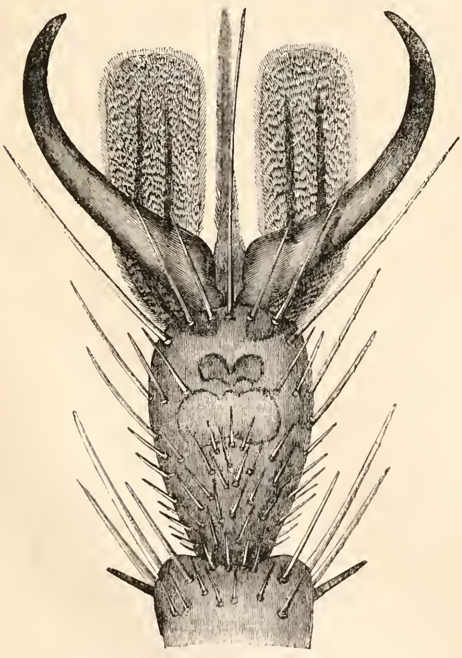

Fig. 86. Foot of *Asilus crabroniformis*, × 40 diam.

said to be less frequent: we, however, have found it in larger numbers, especially on the Mendip Hills.

There are several other species, none of them at all common. One, which is now and then found in company with *A. æstivus*, and may be confounded with it, is called *A. cristatus*. It is somewhat similar in colour, but browner; also shorter, thicker, and perhaps one may say uglier. The feature which distinguishes it from all the other species, and to which its name refers, is that the thorax is covered with long hair from front to back, whereas in the other species the bristles are on the hind part only. The wings are different, being smaller in proportion, much weaker, of a faint brown tinge, and very transparent, with *light brown* veins. Fig. 87 is a drawing of one.

It will be seen from the mouth of *A. æstivus* (fig. 88) that the mouths of the *Asīlidæ* are very different from those of the other flies which we have described; indeed they have no parallel among our other diptera. Their chief peculiarities are an extremely large lingua or tongue (*l*, fig. 88), and a curious metamorphosis of the labium or lower lip (*la*, fig. 88) into an organ which strongly reminds one of the labium of a hemipterous insect, even to its possessing two little pads of hairs at the tip, one on each side, which are commonly called "organs of taste" in bugs. These pads of hairs are the sole representatives of the lobes, which in all other flies have the wonderful capillary channels on their

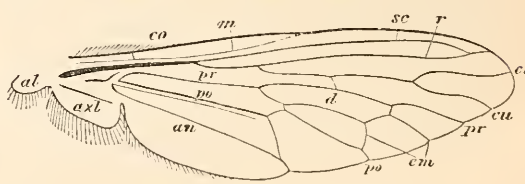

Fig. 87. Wing of *Asilus cristatus*, × 7 diam. Names of veins: *co*, costal; *sc*, sub-costal; *m*, mediastinal; *r*, radial; *cu cu*, cubital; *pr pr*, præbrachial (the end part is sometimes called "sub-apical"); *e m*, externo-medial (two veins); *po po*, postbrachial; *an*, anal; *d*, the discoidal areolet; *axl*, axillary lobe; *al*, alula.

inner surfaces. The lingua is triangular, like the modern bayonet, having one edge downwards. The other two edges are each furnished with a row of stiff hairs, which are set in a backward direction. It ends in a sharp, firm point. The labrum (*lbr*) is short, and not unlike the labrum of a hemipteron. The maxillæ are long, and much stouter than is usual among diptera, but, except for this, they and their palpi are of the ordinary dipterous type, and not at all like the corresponding organs in the mouth of a bug. The mouths of the other *Asīlidæ* are formed on the same pattern, but of course they have generic and specific differences. But the resemblances are greater than the differences, and the general form is so striking that by the

mouth alone, as mentioned before, it may be determined whether or no a fly belongs to the family *Asīlidæ.*

Besides the joining of the sub-costal and radial veins already noticed, there is in the wings of the genus *Asīlus* another and conspicuous feature by which an asilus may be known almost at a glance, namely, that one of the externo-medial veins (*em*, fig. 87) instead of going straight to the margin, turns backwards and joins the post-brachial (*po*).

The legs of all the *Asīlidæ* are extremely

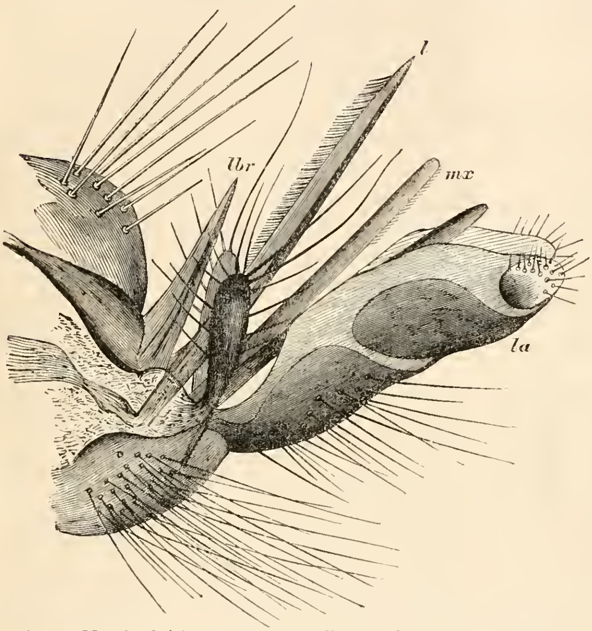

Fig. 88. Mouth of *Asilus æstivus*, × 45 diams. *lbr*, labrum; *l*, lingua; *la*, labium; *mx*, maxillæ. The maxillary palpi are not lettered.

Fig. 89. *Leptogaster cylindricus*, male, clinging to a stem. Magnified 2½ diameters.

stout and muscular, being adapted for the seizure of prey. They are covered with stiff bristles, probably for the purpose of giving a firm hold of the prey when caught. Except in the genus *Leptogaster*, the pads are largely developed. The tenent hairs are

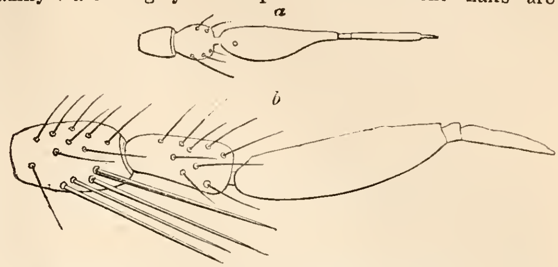

Fig. 90. Antennæ: *a* of *L. cylindricus*, and *b*, of A. æstivus, × 50 diam. Side view (seen from above the third of each is thin).

long and straight; and if any one still doubts whether in walking the pads of a fly's foot adhere by suction or by means of a viscous secretion,

Fig. 91. Tarsus of *Leptogaster cylindricus*, × 16 diam.

he may be convinced that the latter is the case, both by a microscopical examination of the tenent hairs on the pads of *A. crabroniformis*, and by applying a needle to the foot of a freshly-killed specimen, when they will immediately adhere. Suction would require a muscular effort, which could not occur after death. Asili, in fact if not in appearance, have three pads,

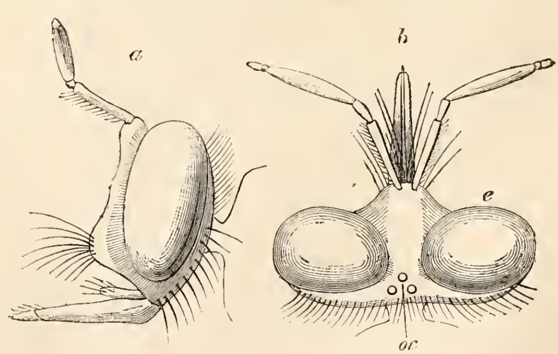

Fig. 92. Head of *Dioctria rufipes*, × 14 diams. *a*, side view; *b*, top view; *e*, great eyes; *oc*, ocelli.

for the central one, though narrow where seen between the two large pads, yet on the under-side of the last joint of the tarsus, where it arises, is broad and furnished with tenent hairs. Besides these, there are tenent hairs on the under-sides of the last two joints of the tarsus, which may be called "auxiliary pads," and also a regular brush of hairs, not tenent but ordinary, on the first joint. Add to this the two stiff claws, as sharp as needles, and numerous hairs and bristles all along the leg, and a more effectual piece of mechanism for grasping, than the foot of an asilus, can hardly be conceived.

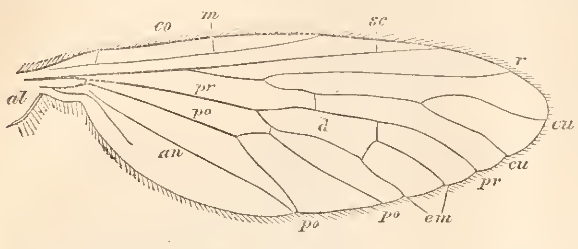

Fig. 93. Wing of *D. rufipes*, × 7 diams. For names of the veins see fig. 87. It differs from the wing of asilus as follows: the radial vein, *r*, does not join the sub-costal, *sc*, before entering the costal; nor does the externo-medial, *em*, join the front fork of the post-brachial, *po*; nor the hind fork of the post-brachial join the anal, *an*.

We now come to the genus *Leptogaster* (λεπτός, slender, and γαστήρ, belly) of which our only representative, *L. cylindricus*, is the commonest of our native *Asilidæ*. It is so named from the cylindrical shape of its abdomen, which is extremely long and slender. An idea of the strange appearance of the fly may be obtained from fig. 89, which shows it in the position that it usually assumes when at rest. This fly is the very opposite to a bombylius, or humble-bee fly, which is short and broad, whereas the leptogaster is long and thin. The former spends the greater part of its life on the wing, but the latter scarcely ever flies; and, as one might expect, the wings of the one and the feet of the other are greatly developed, so that the bombylius has large wings and slender legs, and the leptogaster has tiny wings and stout legs. A foot is shown at fig. 91. The claws are unusually large, and are set almost at right angles to the foot, so that they nearly turn back underneath it. The two outside pads are altogether absent, but the middle pad although not broad is very strong—like a third claw (*e*, fig. 89). The only substitutes for the ordinary onychia are the auxiliary pads (*p*, fig. 89), similar to those mentioned in the description of the foot of asilus, but they are not so large, even comparatively, as in that fly. This peculiar form of feet, adapted, like those of the animal known as "the sloth," for a climbing life, renders walking on a flat surface almost an impossibility to a leptogaster; in fact, the creature may be said to be "at sea" when it gets on the ground, where it is in a worse plight than the proverbial "cat in walnut-shells."

The colouring of *L. cylindricus* is simple, but pretty. Its integument is black, but is wholly concealed by a very fine brownish gray pubescence. The eyes are bronze green, the face golden yellow, and clothed with long yellow hairs. The legs are yellow, with black markings. The antennæ and mouth are minute: an outline of one of the former is given at fig. 90 *a*.

The size of the fly is very variable, it being sometimes as much as $\frac{3}{5}$ inch, and sometimes as little as $\frac{1}{5}$ inch, in length. Although it is such a slender insect, it is by no means a weak one, its frame being tough and muscular; and, no doubt, it is just as fierce as its brethren, so that any unhappy little insect getting within reach of its talons would have but a slight chance of escape. The most likely places in which to find leptogaster are barren spots overgrown with thistles and coarse grass, where they may be often found in hundreds. Specimens can generally be obtained by sweeping with the net in ripe mowing-grass.

It is most probable that those who are not acquainted with the *Dioctriæ*, often pass them by as ichneumon flies, for, in outline, colour, and manner of flight, they have a certain resemblance to this family of the hymenoptera. But, if one be caught and examined, it will be seen that it is a dipterous insect, which may at first be mistaken for another species of *Leptogaster*. It will be found to differ, however, from a leptogaster, in the form of the antennæ, feet, and other parts. *Dioctriæ* are more elegant in form than many of our other *Asīlidæ*, and surpass most of them in beauty of colour.

They live chiefly in hedges and low bushes, and have a great liking for stinging-nettles: they are also found in the same places as the previous genus.

Dioctria rufipes is a fly about $\frac{7}{10}$ inch long and about 1 inch across the expanded wings. The body is black, the front of the head gold-coloured and shining, and the eyes bronze green. The first and second pair of legs are red, and the hinder pair black. The wings are colourless or tinged with brown, with black veins, the halteres light yellow, and very conspicuous. The antennæ, as may be seen in fig. 92, are much larger than those of the other insects described in this paper, being almost the largest antennæ possessed by any of the *Brachycera*, or short-horned diptera, in the British Isles. They are also of a different character, being hairy, and having the olfactory capsules smaller. It seems probable that they are used as feelers, for their length, flexibility, and the possession of hairs, would fit them for that purpose.

The wing is similar in most respects to that of *Leptogaster*, but is broader and stouter, and has the discoidal areolet (*d*, fig. 93) more symmetrical, like that of a *Tabanus*, figured in SCIENCE-GOSSIP, July, 1875, page 148. The feet are like those of the genus *Asīlus*. When treated with caustic potash, and mounted in glycerine, or glycerine jelly, they make excellent polariscope objects.

There is another species a little less common than *D. rufipes*, which is similar to it in many respects, but may be distinguished by the wings, which are of a most beautiful purple-brown colour. Its name is *D. œlandica*. The other species are much less common; the only one, therefore, which we shall mention is *D. flavipes*, a fly which might be confounded with *D. rufipes*, but differs from it in being much smaller, and having a *brownish* body, and by all its legs being yellow.

The *Asīlidæ* all feed on other insects, from which they suck the juices by means of their powerful mouth apparatus. It is noticeable that in them what are presumably the hearing organs (seated in the halteres, and in the wings near their bases,) are well developed; but in the antennæ, the capsules generally considered to be the smelling organs, are small, and few in number. This, we think, favours the supposition that these senses are so situated: for the sense of hearing would seem likely to be the more useful to them, on account of its being able to warn them of the approach of their prey long before it comes within reach of the sense of smell; and afterwards, when the prey is near enough to be seized, it is not smell, but sight, that must guide them in pouncing upon it. The supposition is further favoured by the fact that in the *Tabanidæ* and *Muscidæ* (which, from their different mode of obtaining food, would require the sense of smell rather than that of hearing,) the relative development of these organs is reversed.

Of the three genera above described, the Dioctria are the earliest, appearing from May to July, the Leptogaster appears about a month later, and the Asili are found from June to September. The larvæ of the *Asīlidæ* live in the ground, except those of one of the rare genera, which feed on the decaying branches of trees.

FRANK J. ALLEN and H. M. J. UNDERHILL.

MICROSCOPY.

THE BRAMHALL OBLIQUE ILLUMINATOR.—Mr. Kitton, one of our first authorities on all that concerns diatoms, has been pleased to express his approbation of this invention, and to name it after its inventor. I can confirm all that he has said of its resolving power. Whatever an object-glass is capable of doing, I believe it will enable it to do. In addition to the tests named by Mr. Kitton, I may add, that with a Siebert's No. 7 immersion, and the A eyepiece, I have by the aid of the Illuminator resolved the following, which I consider the most difficult tests in their class. *Pleurosigma Macrum*, *Navicula Crassinervis*, *Frustulia Saxonica*, and *Amphipleura Pellucida*. The only test that has so far beaten me is *Stauroneis Spicula*, and of that I have "glimpsed" the markings. Before I found out this method of illuminating, I could never really resolve any of the more difficult tests, not even *Navicula Rhomboides*, in spite of achromatic condenser, spot lens, prisms, and stops of various kinds, but by its aid, that old difficulty *N. Rhomboides*, dry or in balsam, is as easy as *P. Angulatum* was of old. The illuminator is made in two forms. The one, represented in Mr. Kitton's paper, does for such microscopes as have no sub-stage; the other, and the best, fits the sub-stage, rising and falling by aid of the rackwork. I use a silvered glass mirror of $\frac{3}{4}$-inch in diameter, and a polished metal disc of about an inch, which fit the same holder. On the whole, I prefer the metal; the chief merits of the invention are its simplicity, efficiency, and cheapness. I use only sunlight or clear daylight, but believe it will work equally well with the lamp. Nothing can be more easy than its use. Throw the light *on to* the object more or less obliquely, as that particular object requires, and regulate the reflector beneath, as experience alone can determine. I hope my brother microscopists will have as much success in the use of this illuminator as I have had, and I am sure they will be satisfied.—*John Bramhall, St. John's Vicarage, near Lynn.*

SURIRELLA GEMMA.—The resolution of this diatom is not so much a matter of magnification as one of illumination; whether the $\frac{1}{25}$ in. of your correspondent will show the markings depends upon its quality, its correction, and upon the illumination used. A good $\frac{1}{8}$ in., $\frac{1}{10}$ in., $\frac{1}{12}$ in., or $\frac{1}{16}$ in. will show these markings beautifully, but it is quite possible that the $\frac{1}{25}$ in. will not do so, although it ought. I have, for instance, not resolved the lines into heads yet with my $\frac{1}{50}$ in., whilst my Ross's $\frac{1}{10}$ in. shows them splendidly. I use the narrow side of the flame of a paraffin lamp, place a bull's-eye condenser with its convex side next to it, and obtain thus parallel rays on the mirror or on the rectangular prism. I always interpolate a blue light modifier. Very oblique rays being essential for the resolution of *Surirella gemma*, a large dark ground spot or rectangular stop of the condenser must be employed, and the latter, of course, must be racked up rather high. I have, however, obtained the best results by the use of one of Wenham's paraboloids. I put the darkground stop flush with its apex, and place this about $\frac{1}{4}$ in. below the object. By changing the position of the mirror

or rectangular prism slightly, the true appearance as well as Hartnack's false ones, which Dr. Carpenter has figured, are easily obtained. If the lamp is placed in front of the microscope and the light passed through a bull's-eye condenser directly in the condenser or the paraboloid, the definition is still further improved. The use of monochromatic sunlight facilitates the resolution greatly. Owing to the shape of *Surirella gemma* only a portion of the frustule can be resolved at one time without altering the focus.—*Adolf Schulze.*

Markings on Surirella Gemma.—The transverse markings on *S. gemma* (not gemmæ) can be easily seen with a ¼ objective and moderately oblique light; the resolution of these lines into dots requires a higher power and a very oblique ray. I have seen them very distinctly with a Beck immersion $\frac{1}{10}$ and the "Bramhall Illuminator," even when the specimens are mounted in balsam. The valve must be at right angles to the illuminating ray, and the objective very carefully adjusted.—*F. K.*

ZOOLOGY.

Provincial Natural History Progress.—It is always refreshing and encouraging for us to receive the reports, transactions, proceedings, or by whatsoever name our provincial fellow-naturalists like to dub their work. Among the many significant "signs of the times" is the establishment of natural history clubs in connection with our public schools. We have received the second annual report of the University School Naturalists' Field Club for 1875–6, published at Hastings, and giving a well-written account of their doings, both in the library and the field. The digests and abstracted reports of the papers and meetings are well done, and we wish this unpretending but useful club "God speed!" The sixth annual report of the Wellington College Natural Science Society is also to hand, containing abstracts of the minutes of the meetings and of the papers read, which latter embrace a very wide and suggestive series of subjects. Some of them, especially that by Mr. J. Niven, on "The Conservation of Energy," and another by the Rev. P. H. Kempthorne, on "The Formation of Volcanic Islands," cannot fail to have made lasting impressions. What we are most pleased to see, however, in connection with this society, is the "Zoological Report" for 1875, in which the practical observation of the members of the society has acquired a scientific value in recording observations as to the fauna and flora of the district. The "Annual Report of the Belfast Field Naturalists' Club for 1874–5" is, as usual, welcome, for this club numbers some well-known and enthusiastic naturalists and geologists among its members. We are sorry to see, however, that the President (the Rev. Dr. Macilwaine) thought it necessary to refute, in the presidential address, what the reverend gentleman considered the "atheism" of Professor Tyndall during the Belfast meeting of the British Association. Professor Tyndall's theological inferences at that time did much less harm than his opponents are in the habit of supposing! One of the most interesting papers in the present report is that of Mr. Mann Harbison, on "The Origin of Eskers." Mr. William Gray's paper on "Rudely-worked Flints," contains some suggestive remarks by a most accurate observer. The report of the Manchester Field Naturalists' Society for 1875 impresses us with that wonderful appetite for work which many of our North-countrymen exhibit. Here is a most formidable array of excursions, papers, conversazioni, lectures, &c., all taking place in one year, and admirably condensed into a paper-covered "Report" of fifty-four pages. This club has long been the nursery for Manchester naturalists, and we hope it will long live to fulfil both that function and the still higher one of recording such original observations and remarks as are here so tersely summarised.

Return of the "Challenger."—As our readers will have seen in the public papers, this vessel has returned safely to our shores, laden with scientific material, which it will take months if not years to explain, even to Science. No doubt, the utmost expedition will be taken to lay the results before the expectant world. During her voyage the *Challenger* has traversed nearly seventy thousand miles, and made observations at three hundred and sixty-two places, at all of which soundings have been made and the sea bottom examined. Perhaps the most remarkable "find" in the history of the expedition was that which we noticed at the time, of a gigantic hydrozoan polyp off the Japanese coasts. This measured nine inches across the non-retractile tentacled cup, and had a stem more than seven feet in length, with a diameter of half an inch! This wonderful polyp was found again, in dredging off Honolulu. Living encrinites of new but dwarfed species; "Venus's flower-baskets," or old-world types of siliceous sponges; strange-looking and unknown crustaceans; polyzoa suggesting affinities to Cambrian fossils; these, and a host of other interesting materials, were collected, and will before long be described by Professor Wyville-Thomson, who has his notes well in hand, on the history of this famous expedition. The results are promised us in a published volume in October.

Trophies of the "Challenger."—Among the wealth of zoological specimens the *Challenger* has brought home are two large living tortoises,—one forty years old and the other a hundred. The large tortoise can walk quite as

fast with two men standing on its back as when only carrying its own weight.

Insect Collections.—The influence of different colours of glass on collections of insects has been investigated by M. Capronnier, of the Entomological Society of Belgium, the object being to preserve collections from the decolouration which the green and carmine parts especially undergo in daylight. He operated with four tints of glass—yellow, violet, green, and blue; also with uncoloured glass. It was found that yellow is the best preservative; after ninety days it was the only colour which left carmine nearly quite intact. It is not an absolute preservative, for at the end of this time the tint was slightly altered. It seems that the only way, known at present, of keeping collections absolutely intact is to keep them in darkness.

A Rich Collecting Ground for Mollusca.—During the month of April last, on a patch of ground not more than two yards by six, in Roydhouse Wood, on the Yorkshire estate of the Earl of Dartmouth, situated about three miles from Huddersfield, a friend and I collected living specimens of the following species of mollusca, amongst which will be seen that some are considered both local and rare, viz., *Vitrina pellucida*, *Zonites cellarius*, *Zonites alliarius*, *Zonites alliarius* var. *viridula*, *Zonites nitidulus*, *Zonites nitidulus* var. *nitens*, *Zonites purus*, *Zonites purus* var. *margaritacea*, *Zonites radiatulus*, *Zonites radiatulus* var. *viridescenta-alba*, *Zonites excavatus*, *Zonites crystallinus*, *Zonites fulvus*, *Helix lamellata*, *Helix aculeata*, *Helix fusca*, *Helix rotundata*, *Helix pygmæa*, *Vertigo pygmæa*, *Vertigo edentula*, *Cochlicopa lubrica*, *Carychium minimum*, and *Acme lineata*. In addition to the above list, we also find several of the Slug family; but I have yet not paid sufficient attention to the orders of *Arion* and *Limax* to enable me to include them in the foregoing list, for fear of misnaming them. I shall be glad if any other amateur conchologist could furnish present localities where *Helix lamellata* is found.—*Lister Peace.*

Snake eating Snake.—Happening to read an article in your May number of last year, on this subject, and also on page 160, in the year 1873, it has been suggested to me by one of your subscribers that the following incident may be of interest. I am in a position to affirm that snakes not only devour their young, or their own species, when in a state of confinement, but that the same thing also happens when they are at large. It was a little after midsummer, that is about the month of January, during some of our hottest weather, thermometer standing at about 110° Fahr. in the shade, I was working in a patch of sweet potatoes on the clearing, when I saw a "whip-snake," about 3 feet in length, close to my foot; of course, I instantly turned, and struck it with a hoe, which I had in my hand, but it did not appear very lively, or show fight. On looking at it, it appeared to have a tail at each end, but, on closer examination, I found the tail of a second snake protruding from the mouth of the first, whose body as far down as the stomach reaches appeared considerably distended. I placed my right foot on the tail of the living snake, and, seizing the protruding tail with my left hand, I pulled till I had drawn a second entire snake from the mouth of the living one, it having been swallowed head first. The second snake being as near as possible the same length as the first one, it was unable to contain it all at one time, the head was already partly digested, and, no doubt, as digestion went on and made more room, the remainder would have been drawn in, and in its turn also digested. This was at a time when there was plenty of food of every description for snakes to be found close by. We all know that the poison of a snake is contained in a small bag under the fang in each jaw, but does not the fact that one snake can digest the head of another, containing this poison-bag, go far to prove that the poison can pass harmlessly through the stomach, and that the only danger is when the poison is mixed directly with the blood? These snakes are a very favourite food of our aborigines, but they are very careful to decapitate them directly they are caught, and they will never eat a snake unless they have killed it themselves, and are sure that in its death struggle, it did not turn and bite itself, which often happens. —*A. J. A., Brisbane.*

BOTANY.

The Origin of Common Plant-names.—I think I can give your correspondent in the May number of this journal, Mr. W. G. Piper, the information he desires respecting the Guernsey local name of the common Goosegrass or Bedstraw (*Galium aparine*). The word "Lakoo" exactly represents in English the sound of the name, but it is incorrectly spelt,—if I may be allowed to say so, of a word which forms part of an unwritten *patois*. This peculiar dialect, of which the principal ingredient is old Norman French, is ungoverned by any rules of grammar or pronunciation, and many of the words are so distorted as to be totally unintelligible to any one but a native; for the *patois* of the adjacent islands, Jersey, Alderney, and Sark, all differ more or less one from another. The French word *queue*, a tail, is locally pronounced *quoue* (or koo), and *La quoue*, the name of the common Bedstraw, simply means "the tail." Let me endeavour to explain how this curious appellation has been given. On the 1st of April in each year the Guernsey children divert themselves by pinning or

hooking strips of cotton rags or paper to the dress of any unwary person who can be got at, the "April fools" who thus unconsciously "drag their tails behind them" causing much merriment. In the country parishes, however, *G. aparine* being abundantly provided with hooklets, affords a ready substitute for "tails" of manufactured material. Immediately a sprig of the plant is thrown on and attached to a person's clothes, the cry of *La quoue, la quoue!* (a tail, a tail!) is raised, and continued till the victim of the harmless joke discovers the cause of the sudden outcry. As in some instances in this country, the plant takes its name from the use to which it is applied. It is also known by another local name, which is derived from a word signifying to *scratch.—E. D. Marquand, Brockenhurst.*

Nectaries of Helleborus.—Dr. Masters has discovered that the small cup-shaped petals which form the nectaries of Helleborus are gifted with the same power of absorbing and digesting nitrogenous substances as the leaves of the Venus's Fly-trap and the Sundew.

A Botanical Trip to the Scilly Islands.—Being one of a party who lately paid a visit to these islands, so famed for their botanical treasures, I thought a slight notice thereon might be acceptable to the readers of Science-Gossip. Of course, our foremost object was to procure the rare *Ornithopus ebracteatus*: this we first gathered at Tresco Island, on slopes facing and near the coast. We afterwards found it on both the islands of St. Agnes and Bryer. We obtained—near the mill—*Trifolium suffocatum* and *Viola Curtisii*,—the latter in fruit, coming on it rather late in the season. These both grow on sandy banks near the shore. On St. Mary's, we fell in with *Trifolium glomeratum* on hedge-banks, *Reseda suffruticulosa* in plenty, *Inula Helenium*, *Scrophularia scorodonia* on road-side hedges, and on walls in Hugh Town, the beautiful *Alyssum maritimum*. Thousands of *Trifolium subterraneum* and *Trigonella ornithopodioides* may be seen almost everywhere. *Lotus angustissimus* and *hispidus* in many places. A broad form of *Zostera marina* occurs here. This appears rare in fruit,—a few specimens only in that state being washed up. Had the tides permitted, I might have got a supply from its marine bed: I found the narrow form last season at the same spot rather plentiful. The Water Ranunculi are represented here by some two or three species, and exceedingly fine and beautiful specimens may be gathered. We collected many, nearly two feet long, and in great perfection, but cannot give their names, but would be glad to send samples to any one interested in this tribe of plants to identify. *Potamogeton pectinatus*—probably a variety—was very fine, producing its flowers in rich abundance. *Scirpus pauciflorus* and *S. multicaulis* were both plentiful at Higher Bog. I cannot conclude without saying a word respecting that beautiful lichen *Sticta aurata* occurring on the islands of Bryer and St. Agnes. The richness of its appearance is beyond description, clinging to the stunted heath for protection against the high wind, like rich gems of gold, the sight of which producing a sensation not easy to describe.—*W. Curnow, Penzance.*

Ornithopus ebracteatus.—I visited the Scilly Isles at the end of May last, in company with Messrs. Ralfs and Curnow, to search for the above-named rare plant. We were fortunate in finding it in some quantity in the islands of Tresco and St. Agnes. The specimens were mostly small, owing to the dry season. We consider it to be decidedly native.—*James Cunnack, Helston, Cornwall.*

The Northen Holy-grass.—As several notes have appeared in your pages during the past year on *Hierochloë borealis*, "I am rather surprised that no one has quoted Dr. Parnell's "Grasses of Great Britain." He says of it: "It grows from twelve to eighteen inches high. The root is perennial, creeping . . . a promiuent, broad, obtuse ligule. Leaves short, broad, lanceolate. Although this is one of the earliest of our flowering grasses, it cannot be recommended with advantage to the notice of agriculturists, as its powerful creeping root, and its great deficiency of spriug foliage, are disadvantages which are not compensated by any merits the grass possesses. It is a native of Lapland, Norway, Sweden, Germany, France, Italy, Kamtchatka, and Alaska. Flowers early in May, and ripens its seed in June. In Prussia, this grass is strewed before the doors of churches on festival days, and in Sweden it is sold to be suspended over beds to induce sleep." Dr. Hooker says much the same in his "Students Flora." We have it growing here in the grass-garden, and it had sent up its flower-stalks on April 22nd, even in this by no means early season, and in a bleak situation. Its stigmas were mature by the 27th, and I cannot but think Mrs. Edwards wrong in saying that stamens and stigmas are mature simultaneously. The plant is truly hermaphrodite, but not, I think synacmic, but protogynous. Its foliage is scanty, but the stalk has a strong, sweet taste.—*G. S. Boulger, Professor of Natural History, Ag. Col., Cirencester.*

Sudden Appearance of Plants.—On this subject I see Mr. Edwin Lees, of Worcester, has written to you at some length, in page 199 in the year 1874, and he accounts for the appearance of plants by "the ground having been disturbed." I would ask Mr. Lees through the means of your paper, whether he could assign any cause for the appearance of plants when the ground has

not been disturbed, and not only not disturbed, but subjected to such intense heat from fire, that one would suppose, that any life, some inches below the surface, must become extinct. It is the custom for farmers to take up small selections of land, consisting partly of lightly-timbered forest land, and partly of "scrub land," which any Australian will know to mean land thickly covered with gigantic trees, between which grow up numerous smaller trees, under which again is a luxurious growth of underwood, the whole bound together with a great variety of creepers, varying from the size of a small cane to the thickness of a man's body, which grow up the largest trees and down again to the ground, forming altogether so dense a mass that it is impossible to enter it an arm's length without cutting one's way. From the dropping of the leaves of many centuries the soil becomes very rich, and the farmer will prefer to go to the trouble of cutting down this jungle, and cultivating the rich land, to cultivating the comparatively open forest land, which is very inferior in quality. When the trees are all felled the branches lie over the entire surface of the ground in a mass several feet high, which, when well dried by the heat of the sun, is fired on the windward side: the fire rages during a whole day, and on some parts considerably longer, till all the smaller wood is entirely consumed, and only the stumps and the largest trunks of the trees remain blackened and charred. As soon as the ground has sufficiently cooled, the farmer goes amongst the logs, and without any breaking up of the soil, which is quite loose and friable, makes holes at short distances with a stick called "a dibber," and drops into each hole three or four grains of maize, which, after the first shower of rain, immediately spring up; but also from the mass of charcoal and ashes there springs up a large crop of wild flowers and plants, of which we do not know the names, but amongst which we find very abundant the tomato bush, which is in a few weeks covered with the beautiful rich ripe red fruit of the plain round species, which may be gathered by the hundredweight; also the well-known Cape gooseberry-bush, which bears a large crop of its sweet fruit, resembling a cherry without a stone, and each berry enveloped in a neat little husk of something very like whitey-brown paper. Besides these a very sweet-scented white lily, about a foot high, grows in great profusion; with a great number of other plants, and very pretty flowers, which grow so freely that we have to cut them down, or they would interfere with the growth of the maize. Now, previously to burning the scrub, there had not been the least appearance of any of these plants here or for many miles around; they continue to grow, and do not, as your former correspondent observes in the case he mentions, become extinct; but, on the contrary, they increase year by year, where we do not destroy them; nor do we ever find a similar sudden appearance at any spot which has not been subjected to the fire. This is a fact of every-day occurrence in the bush. I might also mention that the open forest land is generally covered with grass, which grows in little separate plants or tufts; but if from burning off timber we have frequently had a fire at one place, we invariably find that the tuft grass does not reappear, its place being speedily taken by the couch grass.—*A. J. A., Brisbane.*

Pleomorphism.—I cannot see the connection, which Mr. Duffy seems to indicate the existence of, between the facts that certain chemical substances alter in their properties when under different conditions without losing their chemical identity; that one stage in the reproduction of lowly-organised cellular plants resembles organisms considered to be lowly-organised animals; that fungi not only produce buds, but also sexual organs; and that there are two distinct varieties of the primrose which cross freely. To commit oneself to the parallelism of the two first cases, would be to countenance all the fallacies of Heterogenesis. If the existence of a vegetative and a reproductive system be "Pleomorphism," then all organic beings except the Protista are so. The two varieties of the primrose occur not only not on the same blossom under different conditions, which would be allotropic, but not even on the same plant. The dimorphism is diœcious. Does Mr. Duffy merely mean to point out that there are both resemblances and differences between the "three kingdoms," between varieties of one species, individuals of one variety, and even the characters of individuals under different conditions?—*G. S. Boulger.*

GEOLOGY.

Living Ceratodus.—Professor Gervais announces that he has received from the French Consul at Melbourne, an intimation of a new form of fish allied to the *Ceratodus*, in the river Fitzroy. It has all the characters of *Ceratodus Fosteri*, but differs from it sufficiently to be regarded as a distinct genus, to which the name of *Neoceratodus Blanchardi* has been given.

The Old Glaciers of the Northern Slope of the Swiss Alps.—This was the title of a paper recently read before the Geological Society of London, by Professor Alphonse Favre. The author illustrated his remarks by a map on a scale of $\frac{1}{250,000}$, showing the space occupied by the old Swiss glaciers at the time of their greatest extension, and founded in part upon evidence obtained since 1867, when he, in conjunction with Prof. Studer

and M. L. Soret, issued an "Appel aux Suisses" for the preservation of erratic blocks. He said that in existing glaciers two parts may be recognized—an upper one, the reservoir or feeding glacier, and a lower one, the flowing glacier. Applying this division to the old glaciers, it appears that in the glaciers of the Rhone and Rhine the flowing glacier which occupied the plain had a surface nearly equal to that of the feeding glacier which was situated in the mountains. By means of several tables M. Favre showed the height attained by these glaciers, their thickuess, the slope of their upper surface, &c., at various points in the Alps, the Jura, and Swabia, and deduced as the result of the comparison of these numbers:—1. that the Rhone glacier passed over several of the chains of the Jura, and that the ice covering these, far from being an obstacle to the extension of the glaciers of the Alps, actually reiuforced them, and served them as *relays*, the glaciers of the Jura having carried far on the Alpine erratic blocks; 2. that the slopes of the upper surface were variable, and were null, or nearly so, over considerable spaces. At the Calanda, near Coire, there are erratics which seem to be at a higher level than that attained by the glacier. This may be explained by the formation in the glacier of a sort of *eddy*, which would elevate the ice to a certain amount over a limited space. During their greatest extension the Swiss glaciers came in contact with those of central France near Lyons; they united with those of the Jura, the Black Forest, and the Austrian and Italian Alps; they stretched from the plaiu of the Po to that of the Danube; and further, for distances of 50 or 100 kilometres they nearly approached horizontality. Hence they resembled the glaciers of the interior of Greenland and Spitzbergen, so far as can be judged from the descriptions.

Evolution of the Mammalia.—Professor Huxley, in the course of a lecture recently given on the Genealogy of the Horse, said the evidence proved that the existing species of horse had arrived at its present form by evolution, that is, by the gradual modification of a lower and less specialised form. "This case, moreover," he continued, "is not isolated. Every new investigation into the tertiary mammalian fauna brings fresh evidence tending to show how the rhinoceros, the pigs, the ruminants, have come about. Similar light is being thrown on the origin of the caruivora, and also, in a less degree, on that of all the other groups of mammals. It may well be asked why such clear evidence should be obtainable as to the origin of mammals, while in the case of many other groups—fish, for instance—all the evidence seems to point the other way? This question caunot be satisfactorily answered at present, but the fact is probably connected with the great uniformity of conditions to which the lower animals are exposed; for it is invariably the case that the higher the position of any given animal in the scale of being, the more complex are the conditions acting on it. The accurate iuformatiou obtained in this department of science has put the fact of evolution beyond a doubt. Formerly the great reproach to the theory was, that no support was lent to it by the geological history of living things; now, whatever happens, the fact remains that the hypothesis s founded on the firm basis of palæontological evidence."

The Geology of Derbyshire.—We have received a nicely got-up handbook to the geology of this most interesting county, written by the Rev. J. M. Mello, F.G.S., and published by Bembrose & Sons, London, at a cheap price. It contains a geological map and sections, and is indispensable to the geological tourist. Mr. Mello's name is quite a sufficient guarantee for its scientific accuracy, as well as for its literary composition.

NOTES AND QUERIES.

Brick Burning.—Can any of your readers inform me how it is that a clay burnt in an open kiln will burn bricks red, and the same kind of clay burnt in the new kiln (Hoffman's and others), will burn them a whitey colour?—*John Smith.*

Anatomical Preparations.—I have no doubt many of your readers who are fond of investigating the structure of the smaller vertebrata and the invertebrata will, with me, be very glad of some practical instructions as to the mode of "putting up" and preserving anatomical preparations for future study and reference. Noue of the books to which I have access contain any directions under this head; even Professor Rolleston's classical "Forms of Animal Life," which is mainly occupied with descriptions of specimens in the Oxford Museum, gives no hints as to the way in which they may be imitated; nor does Huxley & Martin's more recent work, "Elementary Biology," supply the void. It is not very encouraging to the amateur anatomist, after having spent some hours in dissecting and carefully pinning out the organs of a beetle or slug, to be obliged to throw away the marvellous structure in default of some method of preserving the dissectiou so as to exhibit the parts *in situ*; and I cannot but think some notes on the subject would be welcomed in Science-Gossip. In the biological section of the "Loan Collection of Scientific Apparatus," now on view at South Kensington, is a series of beautiful preparations of the frog exhibited by Prof. Huxley, which should be seen by all who take any interest in the subject, as they are perfect models of what such specimens should be. Of course these preparations owe great part of their charming appearance to the skill of the dissector, but no young anatomist can examine them without wishing to learn how to imitate such beautiful and instructive objects, even in a very humble manner. These preparations are pinned out on slabs of wax (?) and immersed in a fluid (spirit?) contained

in a very peculiar form of flat-sided bottle without neck. Where can such bottles be obtained?—*W. C.*

Silkworms (Science-Gossip [1876], pp. 119, 137).—I should like to inform "Inquirer" that it is not a *sine quâ non*, as Mr. J. G. Henderson intimates, that silkworms must at any time "be fed entirely on mulberry leaves." Some years ago I kept silkworms for two or three seasons following entirely without mulberry leaves, feeding them on lettuces only, and have at the present time some good skeins of silk which I wound off them. It is important that this should be known, as mulberry leaves may not be always obtainable, and the supposition that they are necessary might deter some from keeping the worms. I have been told also that silkworms have been successfully reared on dandelion and other leaves, but cannot vouch for the fact from my own experience. Instead of boxes, as suggested by Mr. Henderson, I kept my caterpillars in paper trays (newspaper doubled and having the edges turned up and pinned at the corners), and did not find them wandering beyond the precincts of their "home." These trays can be renewed as soon as dirty, and it is best that this should be done once a day, when the fresh leaves are given. The chief requisite, in addition to sufficient food, is *cleanliness*. If the stale leaves and excrements of the worms are allowed to remain, the silkworms will become diseased and die. They should not be meddled with too much, especially when changing their skin, which they do five or six times, nor taken up with the fingers when small. The best means of moving the small larvæ is a small camel-hair brush. They should, of course, be kept in a dry and moderately warm place.—*F. A. Edwards.*

Small Tortoiseshell Butterfly (*Vanessa urticæ*).—Can any of your correspondents tell me the difference of the markings between the males and females of the *Urticæ?*—*F. A. Edwards.*

British Clearwings.—In a catalogue of the zoology of the neighbourhood of Bath appended to the Rev. G. N. Wright's "Historic Guide to Bath" (Bath, 1864) two species of Sesia are enumerated, which are not mentioned in the article "Amongst the Clearwings" (Science-Gossip, p. 133), namely, *Sesia fusiformis* (the Broad-bordered Bee Hawk Moth), and *S. bombyliformis* (the Narrow-bordered Bee Hawk Moth). Both are said to be rare. This would raise the number of English Clearwings to sixteen. The list referred to contains only three species of the *Sesiidæ* (the spelling of this word with only one *i* on p. 133 is, I think, incorrect), the remaining one being *Macroglossa stellatarum* (the Humming Bird Moth).—*F. A. Edwards.*

Nettle Beer (p. 118).—If Mr. Piper had been a native of Lancashire or Cheshire, he would scarcely have regarded the infusion of the nettle for the purpose of making the above (or a similar) beverage as a curious (*i.e.*, uncommon) use of the plant. In the counties named, and probably elsewhere, Nettle Beer is almost as extensively sold as Ginger Beer, except in the large towns, where the difficulty of obtaining nettles somewhat restricts the production. Such notices as "Prime Pop and Nettle Beer, plenty of it sold here," are very frequently to be seen over cottage-doors in the country districts.—*George H. Hankinson.*

Anodon Cygneus.—In the April number (p. 96) Correspondent asks why "Gwyn Jeffreys, and other conchological authorities say nothing about the existence of any structural differences in the sexes of the Anodonta." The following short extract from Turton's "Land and Fresh Water Shells of the British Islands," by Dr. Gray, 1857, p. 273, affords a complete answer to the question:—"Some authors have believed them [the Anodons] to be unisexual; but their anatomy proves that they are hermaphrodite and sufficient for themselves."—*George H. Hankinson.*

Ornithological Visitors near Shrewsbury.—It may interest some of the readers of Science-Gossip to hear that on the evening of May the 31st I saw eighteen seagulls flying over Shrewsbury, in the same direction as the wind which was then blowing from the west so that they must have travelled over forty miles, since leaving the sea. They flew so near and low that I could distiuctly see that they were specimens of the common gull (*Larus canus*). I have frequently heard of solitary gulls being seen and sometimes shot, near here, but never such a large number as eighteen, and cannot imagine what could have induced them to fly so far inland. I may also mention that at the beginning of the present year a specimen of the very rare little gull (*Larus minutus*) was shot near Atcham bridge, Shrewsbury, while hovering over the river Tern, which joins the Severn at that point. And that a pair of common terns (*Sterna hirunda*) were shot some time ago by a farmer, as they were fishing in Berringtou pool, Shrewsbury. About the same time a pair of grey phalaropes (*Phalaropus lobatus*) were shot on a farm near Hadnall, Salop, where they had been observed for several days running about among the puddles, seeking for worms and slugs. I do not think they were ever seen swimming, although there was a duck-pond close by.—*H. E. Forrest.*

Birds' Eggs.—Early in May this year I found, lying upon the bare ground, at the foot of a tree, near the entrance of a small wood, in the western part of Sussex, a solitary egg, of a uniform greenish blue colour, somewhat resembling that of a starling's egg, only much paler. In shape it is nearly round, being about one inch in length by seven-eighths of an inch in breadth. The shell is rather rough and very hard for its size. I have referred to Morris's "British Birds' Eggs," and the only representation that at all resembles mine is that of the American or yellow-billed Cuckoo: in shape and colour they exactly correspond, but in size, I should think that mine is rather the smaller. But they differ essentially in two respects, viz., that this rare bird builds a nest, and that it lays from three to five eggs. It may be that the female of some bird had been driven from the nest whilst in the act of laying, and had deposited its egg where I found it, and by a curious coincidence it was deformed. The latter opinion I am rather inclined to adopt. I should be very glad if any of the readers of Science-Gossip would kindly aid me in ascertaining the name of the egg, and in solving the problem of which I am now in utter ignorance.—*E. B. T.*

Parasitic Vorticellæ.—Your correspondent, "H. E. P.," of Long Eaton, in his article on "Parasitic Vorticellæ on Cyclops" asks for further information on this subject. I think he is quite right in naming the object mentioned, *Epistylis parasitica*, but regret (knowing what a pleasant thing it is to make a discovery) that I cannot agree with him as

to its rarity I have witnessed the same many times both on Cyclops and water-snails, from my own aquarium, on various parts of their bodies. In the latter, when the mollusk retracts itself within the shell, the vorticella is drawn in with it. This small vorticella seems much to enjoy a ride on its host, after the fashion of the Anemone and Hermit Crab; if fixed on any immovable object, the shortness of its pedicle would greatly limit its range in search of food. In *Vorticella microstoma*, which is fixed, the length of pedicle compensates for the want of unlimited range. I consider the pedicle of *Epistylis* contractile, as the animal appears and disappears by jerks, but not spirally so, neither does it coutract or expand one-fiftieth part so much as the common vorticella. For more information, let me refer "H. E. P." to the "Micrographic Dictionary," 1875, page 214, art. "Cyclops," last two lines; also art. "Epistylis," page 286. I enclose engraving from Hall's Encyclopædia, figure 16, and letter-press eighty-eight years ago, which is a representation of the same infusoria, there named *Vorticella digitalis*; lastly, to Cooke's "1,000 Objects for the Microscope," page 100, No. 790, named by him, *Foxglove epistylis*.—*J. S. Johnson.*

The Swallow-tailed Butterfly.—Can any of your readers inform me of a place in Kent where this insect is to be fouud?—*Henry Lamb, Maidstone.*

Flume.—In the April number, p. 209, the word "flume" is queried. It is quite a common Western word, meaning a water-channel, and usually would be written "flumen." See photos of Pacific Railway and Californian scenery, such as sluicing and gold-washing by powerful jets by flumens.—*P. France.*

Popular Notions on Irish Natural History.—"R. M.," writing on Mistletoe and Holly in the April number, says, "it is said never to grow in Ireland"; and coupling this remark with the statement respecting Devonshire, I infer it is meant that mistletoe will not grow in Ireland. As far as I know, it is not indigenous here, but it will grow if the berry is put on the trees; this I have proved in my own garden, where I have it growing very luxuriantly on apple-trees, producing flowers and berries in abundance. I also have it in a young state on thorns, laburnum, and beech: I am trying it on others. There are many places in the North of Ireland where it grows, having been introduced. Some years ago there was a very fine plant on an apple-tree in the Botanic Gardens, Belfast. There does not seem anything unfavourable to its growth in Ireland. My observations being made on plants artificially propagated, I should be glad if "R. M." could give another paper on the mode by which the berries are carried from one tree to another; if they pass through the intestines of birds in an undigested state, and are capable of growing when dropped on the branches. Also the agency at work to carry the pollen from the staminiferous to the pistiliferous flowers, these being on different plants sometimes a long way apart, and the pistil not being prominent, as in flowers fertilized by action of the wind. I have not observed bees or other insects frequenting the plants. Another popular error is, that toads will not live in Ireland. I can refute this, as I have had them in my fernery for years, and had them breed, and go through all their transformations. If any naturalists in England would send me toad spawn, I should be much obliged, and could experiment more fully than I have done, and would put them where enemies would be few.—*W. H. Phillips, Holywood, County Down, Ireland.*

A Curious Coincidence.—Sir John Lubbock, in his work on "Pre-historic Times," and other writers, have lately shown us how well the habits of primeval man may be illustrated by the manners and customs of modern savages, and I have met with an interesting fact of a similar nature. In chapter viii., p. 279, of "Pre-historic Times," there is an interesting quotation from a paper in the Transactions of the Academy of Science of St. Louis (Ohio), 1857, p. 61, by a Dr. A. C. Koch, who describes the remains of a mastodon found in Gasconade county, which had appareutly been stoned to death by the Indians, and then partially consumed by fire. The fire, he says, was evidently "not an accidental one; but, on the contrary, *it had been kindled by human agency*, and, according to all appearance, with the desigu of killing the huge creature which had been found mired in the mud in an entirely helpless condition." The bones were found standing up in the clay, and only those above the surface were charred. There were also broken pieces of rock, from the river near, and pebbles, none of which were *in situ* in the clay, but apparently fetched from the river-bauks, where there was a layer of them. Mingled with the ashes, bones, aud rocks, were arrow-heads, stoue spear-heads and axes; and a stone arrow-head was found under the thigh-boue of the skeleton, actually in contact with it. Curiously enough, in G. W. Earl's work on "The Papuans" (Ballière, London), p. 154, we read the following, respecting the Lemangs, a degraded Negritto race, supposed to be the aborigines of the Malayan peninsula, extracted from the fourth volume of the "Journal of the Indian Archipelago." "The rhinoceros they obtain with even less difficulty. This animal which, is of solitary habits, is found frequently in marshy places, with its whole body immersed in the mud, and part of the head only visible. The Malays call the animal 'Badak Tapa,' or the recluse rhinoceros. Towards the close of the rainy season, they are said to bury themselves in this manner in different places; and upon the dry weather setting in, and from the powerful effects of a vertical sun, the mud becomes hard and crusted, and the rhinoceros cannot effect its escape without considerable difficulty and exertion. The Lemaugs prepare themselves with large quantities of combustible materials, with which the quietly approach the animal, who is aroused from his reverie by an immense fire over him, *which being kept well supplied* by the Lemangs with fresh fuel, soon completes his destruction and renders him in a fit state to make a meal of." It is curious to find that a method employed by existing savage tribes, to master the rhinoceros, should have been applied in prehistoric times to the vast Mastodon.—*F. A. A.*

Geese and Herbs.—At page 118, I observe you ask this question:—Has any one ever seen geese eating the *Galium aparine?* I have not, but there is a grass (*Bromus mollis*), which in this neighbourhood is called goose-grass, which I have seen them devour rather greedily. It is an early grass, with a large woolly stem and head, but not of much value to the agriculturist. I have never seen geese eat the *Potentilla anserina*, but in places where geese are kept I have seen them eating the short grass, *Bromus mollis* being one, between the

Potentilla plants. It does not seem to be a great step between goose-grass and gander-grass. The *Galium aparine* here is called Hariff, cleavers, goose-grass, and the seed which is not liked in the corn samples by the farmer is called Clites.—*John Branenden, F.G.S., Cirencester.*

The Cuckoo's Eggs.—Can any of the readers of Science-Gossip give me their opinions as to whether the cuckoo ever hatches her own eggs, as I have been informed by some persons that it never does, while, on the contrary, others assert, and a book in my possession also affirms, that she does *sometimes* both hatch and rear her brood? Hoping to see some of your correspondents giving their opinions on the subject.—*Joseph G. Henderson.*

Popular Names of Orchids.—The children here call the *Orchis maculata*, "Skeet-legs." I am unable to account for the name; perhaps some of your numerous correspondents may be able to solve the difficulty.—*H. J. Taylor, Folkestone.*

Silkworms.—In answer to "Inquirer," I can tell him the way I manage my silkworms, but I do not pretend that it is the best way by any means. I procure two or three trays, about 14 inches by 10 inches, and 1 inch deep; old chocolate-boxes will do very well. In one of these I place my eggs, and as soon as they begin to hatch, I remove them with a camel's-hair pencil slightly damped on to a young leaf of lettuce: great care must be taken in removing them, as when so young they are exceedingly liable to damage. As soon as the leaf is eaten or dries up, the silkworms must be removed with the camel's-hair pencil to other leaves. When they have changed their skin for the first time, I begin to feed them on mulberry; it is best to divide them now into two or more batches, which will prevent overcrowding. When full-grown, I make a number of spiral coils of paper, similar to those made by grocers, for sugar, &c. In each of these I place one silkworm. As soon as it has changed, the silk can be wound off and the pupa placed on a layer of sawdust or bran. The boxes in which the worms are kept had better not be covered, as they will never attempt to escape as long as they have plenty of food.—*H. Wiglesworth, Chilton Lodge, Rotherham.*

Water-Rat.—As I was trout fishing on the 18th April, in a stream at Albourne, I saw a very large water-rat moving about among the lower branches of a whitethorn hanging over the water, and I distinctly observed it nibbling and eating the young green leaves of the bush. This was so unusual a sight to me that I watched it for some time. Is this a fact in natural history that is commonly known?—*Arthur H. Borrer.*

Dogs eating Wasps.—I am much obliged to "D. R." for replying to my query on this subject, and beg to say that the terrier of which I spoke was stung by a wasp when quite a puppy, which confirms his opinion that it is vengeance that prompts his enmity to the insect; but still I am puzzled to know how it is that the dog is not stung when eating a wasp he has recently killed, or when swallowing one alive. I know people are often stung by dead wasps; I shall be glad to be enlightened about this.—*S. M. P.*

Phosphorescence.—A few evenings ago, upon retiring to rest, I saw a large centipede upon the ceiling. Not liking such an insect as a companion during my nocturnal slumbers, I killed it, but was surprised to see a long streak of pale blue phosphorescent light. To make sure that it was so, I put out my light, the phosphorescence gradually faded away, lasting about a minute. I shall be glad to know if it is the nature of these insects to emit this light when killed.—*J. E. S.*

Teeth of a Fly.—I am much obliged to the gentlemen who have so kindly answered my query on this point, and will try to verify by actual observation the information they give. I would point out to Messrs. R. and J. Beale, that I did not say their preparation did not show the teeth as now described, but rather that the mere fact of their name being on the slide was sufficient to prove that such organs must exist. I fancy, however, that Mr. Ford's version of the question is correct, viz., that the preparer has been mistaken in considering the false tracheæ as teeth. I have not at present been able to re-examine the slide I first saw, to say with certainty whether this is so or not, but hope to do so before long, and will communicate the result of my examination, especially if I find I have made a mistake.—*T. J. B.*

Juniperus communis.—The finest exhibition of this shrub which I have ever noticed is on the Cotteswold Hills, Inferior Oolite, between Birdlip Hill and Painswick, where I have seen on Painswick Hill, which is very exposed, short stumpy plants only a few inches high, but in Cranham Wood examples occur of over twelve feet high, which before now I have seen covered with berries, which used to be "picked," as the children said, "by them for the doctor."—*J. Buckman, Bradford Abbas.*

Hawfinch.—It is undoubtedly a rare occurrence to find the nest of this bird in Somersetshire, as it is a rare and casual visitant. There is no instance recorded of its having bred in the North of England, although some have been taken there. Selby states in his Catalogue that a few years ago he saw one at Alnwick Castle, which was killed at Hulne Abbey, and that two specimens were some time ago shot near Stockton-upon-Tees. Mr. John Hannock, of Newcastle, the eminent naturalist, has three specimens in his collection, which were shot in Streatham Park—two of them, a male and female—in the winter of 1837. Several specimens were seen near Belsay Castle in 1860 and 1862.—*Dipton Burn.*

BOOKS, &c., RECEIVED.

"Notes on Collecting and Preserving Natural History Objects." Edited by J. E. Taylor, F. L. S., &c. London: Hardwicke & Bogue, 192, Piccadilly.

"Monthly Microscopical Journal." June.

"Journal of Applied Science." June.

"Land and Water." June.

"Ben Brierley's Journal." June.

"Canadian Entomologist." May.

"Botanische Zeitung." June.

&c. &c. &c.

Communications Received from:—G. H. K.—F. K.—H. G. G.—E. E.—R. J. W.—J. P.—J. R. B.—A. P.—J. S.—S. S.—H. S. J. U.—F. A. A.—J. S. H.—F. H. A.—A. J. R. S.—W. C.—S. H.—J. H. B.—L. P.—C. W. W.—Rev W. W. S. (Tasmania).—C. H. M.—H. J. S.—J. H C.—M. D.—T E. M.—H. E. F.—Dr. G. D B.—W. H. N.—G. C. D.—A. K. L.—W. S.—W. H.—F. M. H.—H. E. P.—A. M. J. C S.—J. B.—A. S.—W. K. M.—E. F.—A. G.—A. F. G.—E. B. T.—J H. G.—C. F. & W. H. C.—C. U.—H. L.—W. P.—C. D.—Dr. C. C. A.—G. H. H.—E. W.—E. D.—F. A. E.—J. S. J.—E J.—T. H. P.—M. F.—F. S.—R. J. M.—J C.—H. D.—H. H. C. G. G.—L. R.—B. M. O.—R. H. P.—E. D. M.—B. B. W.—G. M. D.—W. E S.—G. J. P.—J. P. S.—J. F. R.—F. H. A.—S. J. B.—A. J. A.—H. E. W.—J. H. B.—C. W. W.—W. C.—E. B. F.—D. B.—C. C. H.—C. F. G.—&c., &c.

NOTICES TO CORRESPONDENTS.

Editorial.—We are glad to have received so many replies favourable to the enlargement of Science-Gossip, and increasing the monthly price to sixpence. We should now like to hear the other side, and shall be extremely glad if any of our old correspondents or contributors who think it is best "to let well alone" will give us their reasons for not altering the character of a magazine which for so many years, we are glad to say, has been most successful. *Audi alteram partem* must be our motto.

*** Would our lady contributors deem it an ungracious request if we desired them *not* to underline, as well as place in inverted commas, so many of their contributions? It only means pen and pencil work for the Editor to undo, solemnly and painfully, what so many of our fair contributors have been at equal pains to originate.

R. J. W.—The fungus sent is the delicious Morel (*Morchella esculenta*). When dried it is used for flavouring soups, chops, &c. To that use the specimen sent has already been put!

James P. (Birmingham).—Apply to Hardwicke & Bogue, 192, Piccadilly, who will send you any of the volumes of Swainson's "Naturalists' Library" you may require at the price specified in their advertisement.

Nemo.—See answer in last month relative to the Linnean Society.

J. R. Barker.—The geological specimens from the clay-bed you mention are undoubtedly from the "Drift" or Glacial formation. They are all of them fossils derived from older rocks, washed out, re-sorted, and re-deposited. No. 1 is a *Belemnite*; No. 2, the fragment of an *Ammonite*.

R. Manning.—We should like to see a specimen of the "red rain" before deciding as to what it is. Please send us a slide.

W. Curnow.—Many thanks for the botanical rarities forwarded to us.

H. J. Savory.—Your specimens of moths are .—1. *Crambus selasellus*, and 2 is a *Crambites*. You should get Newman's "Moths."

T. E. Mason.—Your "larva" is a millepede, *Iulus communis*.

H. E. Forrest.—Your egg was so utterly smashed, owing to its being enclosed in a light pill-box, and that again enclosed in your letter, that it was quite unrecognizable.

A. K. L.—Your plant is a Canadian weed, which has spread greatly in England during the last few years, and is called *Claytonia perfoliata*. The leaves make an excellent salad.

E. Duprey.—No charge is made for inserting "Exchanges" unless they run to more than three or four lines.

J. H. Campbell (Londonderry).—It is not usual for us to return specimens sent us to be named. The expense of postage, and the time required, in addition to having the specimens named, is very great. Your moths are as follow:—1. *Orthosia suspecta*; 2. *Epunda lutulenta* (female); 3. *Miselia oxyacanthæ*; 4. *Carabrina cubicularis*; 5. *Cerastis spadicea*; 6. *Tæniocampa populeti*. You had best obtain Newman's "Moths," published by Hardwicke & Bogue, 192, Piccadilly, whose illustrations and descriptions will enable you to identify all the British species for yourself. Such an engagement would give you a better knowledge of the insects than any number of specimens named for you.

W. E. Sharp.—For information in reference to the New Forest, see Wise's "New Forest: Its History and Scenery," published by Smith, Elder, & Co. Also consult chapters in "Out of Doors," by the Rev. J. G. Wood.

EXCHANGES.

Wanted, Fossil Bones and Teeth, or portions of the same, for section-cutting. Offer in exchange well-mounted Microscopic Slides.—M. D., 116, Esplanade, Deal.

Wanted, Slides of *Amphipleura pellucida* which can be resolved with a $\frac{1}{10}$ in., or a good clean gathering of this diatom against well-mounted slides of butterfly scales covered, for the $\frac{1}{50}$ in. or other Micro Objects.—Adolf Schulze, Glasgow.

Wanted, Oblique Sections of Exogenous Woods, mounted or unmounted, in either or all of the following directions, viz.:—Transverse and radial, transverse and tangential, radial and tangential. Must be exceptionally good, and accurately named. Exchange or otherwise.—J. C. S., 18, Loraine-road, Holloway, London, N.

Mounted Slides of Foraminifera to exchange for Unmounted Objects of any kind.—Alexander Mackie, 41, Thornhill-road, London, N.

Seeds of *Erinus alpinus* (a pretty wall or rock plant, *rare*) for Fossils, or Specimens of Basalt, Greenstone, Syenite, Serpentine, Talc, Hornblende, Mica, Felspars, or any Schists, *labelled*.—Rev. W. Stocks, Downham Parsonage, Clitheroe.

For *Æcidium compositarum*, v. *Tassilaginis* (really good specimen), send other Microscopic Fungi to H. E. Perry, The Bank, Long Eaton, Derbyshire.

Unio *tumidus*, var. *ovalis*, offered for either of the following species:—*Limnea palustris*, var. *albida*; *Limnea auricularia*, var. *acuta* or *albida*; large specimens of *Limnea peregra*, var. *ovata*; *Limnea Burnetti*; or any rare species of British Marine Shells.—Address, Miss F. M. Hele, Fairlight, Elmgrove-road, Cotham, Bristol.

Duplicates.—*Ægeria*, *Magæra*, *Tithonus*, *Pamphilus*, *Argiolus*, *Dispar*, *B. Quercus*, *Nupta*, *Vinula*, *Tiliæ*, &c.—W. Harper, Norfolk Park Cottage, Maidenhead.

Astragalus *hypoglottis* for other Plants.—G. C. Druce, Northampton.

Helix *pisana* (British) to exchange for *Helix aperta*, *Paludina achatina*, *Conovulus denticulatus*, *C. bidentatus*, or other rare British Shells.—C. Upton, 17, Eldridge-road, Rouel-road, Bermondsey, S.E.

Sections of Foreign and other Woods, cut to $\frac{1}{100}$ of an inch, exchanged for Unmounted Palates, Foraminifera, Polycistina, and Zoophytes.—H. L., 6, Upper Phillimore-gardens, Kensington, London, W.

For exchange well-blown Eggs of Dipper, Black Redstart, C. Redstart, L. Redpole, Gannet, Crested Grebe, C. Bunting, Ring Ousel, Chiffchaff, Tree Sparrow, Quail, Whinchat, and many others. Lists exchanged.—W. Petch, Heeley, Sheffield.

I am in want of a number of good specimens of Jackdaws' Eggs (one side-hole). Will give a few rare specimens of other Eggs for same locality wanted.—C. Dixon, 60, Albert-road, Heeley, near Sheffield.

Well-mounted Slides, chiefly entomological or marine, in exchange for Wood's "Insects Abroad," or for other good Slides or Unmounted Material.—G. N. W., 10, Edinburgh-place, Weston-super-Mare.

A few *Rissoa lactea* and *R. striatula*, found living in Jersey, offered for good specimens of rare British Marine Shells.—E. Duprey, Queen-street, 15, Jersey.

A sample of Diatomaceous Deposit, containing several rare forms, in exchange for a well-mounted selected Diatom Slide.—T. Powell, 7, Poultry, E.C.

Wanted to loan, the number of *Phytologist*, first volume, containing Mr. Notcult's notice of plants growing round Daventry. All expenses paid.—G. C. Druce, Secretary, Northampton Naturalists' Society.

One Hundred Slides for exchange. Diatomaceæ, Entomology, Spicules, Scales, &c. &c. Send lists to M. Fowler, 20, Burn-row, Slamannan, near Falkirk, N.B.

Fossilized Pine, showing glandular ducts. Send stamped and addressed envelope to L. Ratcliffe, Southfield House, Mytholmroyd, near Manchester.

Wanted, Rubbings of Monumental Brasses in exchange for Fossils from Chalk, Seaweeds, Ferns, or Rubbings from this district.—Address, Frederick Stanley, 6, Clifton-gardens, Margate, Kent.

Send well-mounted Slide, in exchange for Transverse Section of Hairs from Tail of Elephant, mounted in balsam; a beautiful object when polarized.—G. Garrett, Harland House, Wherstead-road, Ipswich.

Specimens of *Ornithopus ebracteatus*, *Trifolium suffocatum*, and *Sticta aurata*, in exchange for other rarities.—W. Curnow, Pembroke Cottage, Newlyn Cliff, Penzance.

Larvæ of *Plantaginis* for other Larvæ, Pupæ, or Ova.—A. Sickard, Wolsingham, Darlington.

Two Thousand specimens of polished Slabs of Madrepore, collected in Devonshire. Will exchange for Slabs from other counties, or for Trilobites or other very good Fossils.—Three Thousand British Shells. Will exchange for other British Shells. Also Fossils and Minerals to exchange.—Direct, A. J. R. Sclater, 9, Bank-street, Teignmouth, Devon.

Mounted Slides of interest for Unmounted Materials. Soundings and objects connected with the sea preferred.—Send list to C. P. Ogilvie, Sizewell House, Leiston, Suffolk.

Lepidoptera in exchange for British Sea-birds' Eggs. Should also like to exchange for Works on Entomology, Ornithology, and Conchology.—W. K. Mann, Granby House, Clifton, Bristol.

Fossils named and localized for Foreign Shells.—Address, M. M., Post-office, Faversham.

Good Skin of Purple Heron for British Birds' Eggs, Raptores, or Grallatores.—C. C. Hanson, Greetland, Halifax, Yorkshire.

Botanical Exchanges.—Offered Nos. 334, 353; wanted, Nos. 101b, 148, 154b, 158b, 159, 161c, 164b, 166b, 200c, 200d, 202b, 202c, 207b, 215, 220b, 222b, 232b, 232c, 273b, 273c, 285b, 309, 395, 401, 457b, 473b, 522a, 522b, 536, 545, 546, 535a b c, 598, 632a, 670 a b c d, 691b, 705b, 720, 721, 722b, 730, 747b, 753b, 846b, 949b, 956 b c, 977a b, 997, 1,016b, 1,017b, 1,020, 1,033, 1,035, 1,050, 1,059a c, 1,073a, 1,079b, 1,088, 1,105, 1,115, 1,139b, 1,149b, 1,194, 1,195, 1,196, 1,204b, 1,219c, 1,222, 1,223, 1,227a, 1,228, 1,237b, 1,247, 1,262, 1,266, 1,267, 1,270, 1,271, 1,286, 1,299, 1,300, 1,386b, 1,410, 1,425b, 1,434b, 1,437, 1,468b, 1,472b, 1,553, 7th Edition London Cat.—James Cunrack, Helston, Cornwall.

HOLIDAY RAMBLES IN THE WEST OF IRELAND.

THE PLANTS OF THE BURREN.

By G. H. Kinahan, M.R.I.A.

THE unique and beautiful assemblage of plants in the barony of Burren [*anglicè*, a rock, or rocky district], co. Clare, is a rich treat to the botanist. They, however, cannot all be studied, unless the observer spend at least a year in the country, as some are only found in the spring, others in the summer, while some appear in the autumn, others in the winter. Some years ago my old friend and colleague, the late F. J. Foot, Esq., M.A., made a careful examination of the district, and in a paper read before the Royal Irish Academy he gave a list and description of all the characteristic and rare plants, while a map that accompanied the paper pointed out the localities where they were found.*

Mr. Foot's map is an advantage, and at the same time a disadvantage, to the botanist, as some barbarians, since its publication, have visited the country, and by its help found out the localities of some of the rarest plants and taken them all away, thus obliterating them from the list. From Mr. Foot's paper I have extracted the following names of the characteristic and rarer plants :—

List of the Characteristic and Rare Plants of the Barony of Burren.—Arabis hirsuta, Arenaria verna, Cerastium arvense, Geranium sanguineum, Euonymus Europæus, Geum rivale, Rubus saxatilis, Agrimonia eupatoria, Sedum acre, Saxifraga hypnoides, Sanicula Europæa, Rubia peregrina, Galium pusillum, Asperula cynanchier, Valeriana officinalis, V. rubra, Gnaphalium dioicum, Chlora perfoliata, Juniperus nana, Taxus baccata, Triglochlin palustre, Listera ovata, Orchis pyramidalis, Ceterach officinarum, Gymnadenia conopsea, Polystichum aculeatum, P. lobatum, P. lobatum *var.* Lonchitidoides, Asplenium ruta muraria, A. trichomanes, Scolopendrium vulgare, Thalictrum majus, T. minus, Helianthemum canum, Spiræa filipendula, Dryas octopetala, Sedum rhodiola, Arbutus uva ursi, Pyrola media, Gentiana verna, Orobanche rubra, Epipactis ovalis, Habenaria viridis, Asplenium marinum, Cystopteris fragilis, Osmunda regalis, Potentilla fructicosa, Adiantum capillus veneris, Rhamnus catharticus, Potentilla comarum, Sedum telephium, Sambucus ebulus, Galium boreale, Ajuga pyramidalis (*very rare*), Staticé spathulata, Orchis pyramidalis *var.* Floriplena, Habenaria albida, Ophrys apifera, and Botrychium lunaria.

Some of these are most beautiful, their flowers decking the sides of the hill and crags in their respective seasons.

To the general visitors, however, the ferns seem to be the great attraction, the species and varieties being most numerous and luxuriant. As might be expected, those that come to the greatest perfection are the ferns which require a limy soil or rocks, such as the Asplenium ruta muraria, A. trichomanes, A. adiantum nigrum, Ceterach officinarum, Scolopendrium vulgare, Cystopteris fragilis, and Ophioglossum vulgatum. Besides these, others that should be specially mentioned are the Adiantum capillus veneris, Asplenium marinum, Osmunda regalis, and Botrychium lunaria. The varieties of both A. ruta muraria and A. adiantum nigrum are extremely numerous. On one hand, the fronds are stunted with ovate pinnæ, while on the other they are most luxuriant, the pinnæ

* "Trans. Royal Irish Academy," vol. xxiv. p. 142.

being excessively acute. These, by some, would be considered different species; as, for instance, the ovate A. adiantum nigrum has been called A. obtusum, while the acute variety goes by the name of A. acutum. Here, however, in both the Ruta muraria and in the Adiantum nigrum, every gradation between the obtuse and the acute forms are found, but the normal form of the country for both species is the semi-acute. The obtuse varieties seem to be most uncommon, growing on open crags and cliffs that have a south aspect; while the typical acute forms seem to affect north aspects; and in places looking S.E., E., and N.E. are found the intermediate forms. C. officinarum also has many varieties; a handsome one having a very luxuriant foliage, the pinnæ being so large and close that they overlap one another, and if their margins are serrated the plant is very handsome. A peculiar variety, in places not uncommon, has marked intervals, between small pinnæ, the latter being deeply serrated. One variety of A. trichomanes has its pinnæ so deeply cut that it might nearly be mistaken for A. fontanum; while of S. vulgare there is a lanceolate variety that has a conspicuous marginal rib, the edge outside which is serrated. This last variety grows well, and greatly improves when cultivated. A. capillus veneris, although liking a limy soil, is one of the marine ferns, and usually only occurs in the immediate vicinity of the sea. Mr. Foot, however, found it growing inland in two places, in one of which, although the plants were neither numerous nor very luxuriant, yet the pinnæ were very large, some being the size of a florin-piece. In the deep open joints of the limestone crags adjoining the sea it is wonderful to find the length to which the fronds of A. marinum grow, all being between 2 ft. and 3 ft. long, and as fine as any to be got at Madeira. Here it should be pointed out that a peculiarity of the ferns of the Burren is the great length of their stipes, some of the A. adiantum nigrum having fronds over 2 ft. long, many of those of the C. officinarum being from 9 in. to 12 in., while the fronds of others are in proportion. The Osmunda regalis, Mr. Foot states, is only found on some patches of coal-measures that cap the carboniferous limestone. V. lobatum *var.* Lonchitidoides is very fine and abundant, and might easily be mistaken for Polystichum lonchitis.

THE ORIGIN OF GREENSANDS.

MR. S. A. STEWART does not appear satisfied with my comments on his remarks concerning "the Greensand and its Origin." In SCIENCE-GOSSIP" for April (No. 136), he quotes the paragraph from my article, and offers to bury his tomahawk if I consent to read "cannot be" for the words "have not yet been" in the first sentence. I am quite willing to make the alteration he suggests, but nevertheless I entirely fail to see how that would bring his opinions into greater accord with mine. I am ready to admit that the Irish Geeensands are not composed of foraminiferal casts; but the admission only seems to me to widen the divergence between our expressed opinions. Mr. Stewart considers that it is necessary for Dr. Carpenter's argument "that *all* greensands should be constituted of glauconitic casts of foraminifera," and consequently that one exception would be fatal to his theory. Now, I have already stated that I regard this as an unwarranted assumption; on this point, therefore, I think we can only agree to differ.

I may be allowed, however, to explain what Mr. Stewart terms my errors. In the first place, he considers that no one can be misled by Dr. Carpenter's expression, "the Greensand deposit of the Cretaceous Epoch." Mr. Stewart states this to be "a definite term, referring not to a greensand bed, but to the Greensand formation as a whole." It would have been more satisfactory had he explained what he intended to convey by the term "Greensand Formation." No such formation is acknowledged in recent manuals of Geology. An Upper Greensand is known, and a Lower Greensand formation is known; but these are separated by 100 to 300 feet of Gault, and it is certainly not usual to unite all these beds under the name of the "Greensand Formation"; nay, the very line of division between the Upper and Lower Cretaceous systems is drawn at present between the Gault and Lower Greensand, and Mr. Stewart will surely not ignore this fact.

The truth is that the terms "Lower Greensand" or "Greensand Formation" are, like all other lithological names, very unsuitable appellations for periods of geological time, and I am sure I echo the wish of most geologists when I say that the sooner they are discarded the better.

Mr. Stewart next remarks that it has been pretty well established, and is indeed *admitted* by me, that the casts of shells occurring in the Cambridge Greensand are derived from an older bed. Now, if this fact had been established before the year 1875, I should certainly not have written, and the Geological Society would probably not have printed, fifty pages as an attempt to prove it. I am certainly likely to admit a proposition which I have endeavoured to maintain in a publication, the authority of which Mr. Stewart wisely esteems superior to mine.

He thinks that I must have read his first communication in a hasty manner, otherwise I could not have *imagined* that he considered the fact of the absence of certain fossils from the Antrim Greensand proved the non-existence of these fossils in any other locality. Perhaps he will allow me to quote his own words, from SCIENCE-GOSSIP, 1875, p. 243,

in support of my imagination:—"The assumption that the Greensand is formed of the casts of Foraminifera should be rejected for the following reasons:—1st .. 2nd .. 3rd, and conclusive. The grains of glauconite in the Irish Greensand, when examined under the microscope, show no real resemblance to Foraminifera."

Mr. Stewart now says that he never met with an Irish naturalist who was capable of such an assumption, but I am afraid his friends can hardly make the same observation. Lastly, with regard to the "authorities," my reference to which has inspired more than half of Mr. Stewart's letter, I beg to assure him that the word is not used by me in any peculiar sense of my own, and I am at a loss to understand why he should not suppose that I used it in precisely the same sense as he did himself in the paragraph I quoted at the end of my letter. I did not intend the word to have any other signification more or less than that which he there meant it to convey, and I gladly take an opportunity to be in accord with him, at any rate, on one point. This affords us, moreover, a fitting occasion to close our tilting. Mr. Stewart will see, with me, I think, that there is little likelihood of our settling the questions which beset the origin of greensands by any further correspondence.

Cambridge. A. J. Jukes Browne.

NOTES ON THE DIPTERA.

VI.—Conopidæ.

Every entomologist must be aware that the two best-known families of the Diptera—the *Muscidæ* and the *Syrphidæ*, are closely connected one with the other; but he is not so likely to know that there are other families besides the Syrphidæ, whose resemblance to the Muscidæ is so great that it is difficult to decide whether or no they should be reckoned as separate. Such are the Conopidæ, the subject of this paper. They are a group of flies on the classification of which authorities cannot agree; since some would range certain genera under the Muscidæ, which others place with the Conopidæ proper. We shall include in the family the three British genera *Conops*, *Zodion*, and *Myopa*, following the arrangement of Professor Westwood, although Walker, in his "Insecta Britannica," is almost inclined to class the two latter with the Muscidæ.

The three families, Syrphidæ, Muscidæ, and Conopidæ seem to be all linked together by a family of small insects called *Pipunculidæ*, which are so much like each of them that they might almost be classed with either.

The Conopidæ are not common insects, or at least are not commonly seen; but the entomologist in search of other diptera is sure to meet with specimens now and then. They may, however, be commoner than they seem to be, and the rarity of their appearance may be due to their habits. At any rate, they are widely distributed, for the very same species may be found not only in all parts of the British Isles, but also over the greater part of Europe. Their life-history is peculiar, and not too well understood. We ourselves have not been able to trace it; but we have gathered a little information from various books treating of the Diptera. All of them appear to be parasitic upon Hymenoptera, for they are always found in places where bees and wasps are abundant. *Conops quadrifasciata* is well known to be a parasite living within the bodies of large humble-bees, since specimens have at times been reared which have made their escape from the abdomen of a bee after it has arrived at the imago state. It is astonishing that a humble-bee can live with so large an insect as a Conops within its body.

Of the transformations of the other genera hardly anything is known: Walker merely says that "the species are probably parasites of other insects." Will not some entomologist, living in the country and having plenty of leisure, devote himself to tracing out the life-history of these curious flies? It will probably prove as interesting as that of the beetle Sitaris, related in Sir John Lubbock's "Metamorphoses of Insects" as investigated by M. Fabre. (In relation to the larva of this beetle, we would remark that this year we have found it clinging to *Bombylii*, or humble-bee flies. This is "circumstantial evidence" that Bombylii frequent the nests of Anthophoræ (a genus of bees) to lay their eggs, since Sitaris itself, from its manner of life, cannot be the parasite of a fly, but only of a bee.)

The three genera *Conops*, *Zodion*, and *Myopa* are distinguished as follows:—The antennæ of the first genus, *Conops*, have no bristle; *i.e.*, the joints which in its relatives are prolonged into a slender filament, are quite short and thick; they are situated at the tip of the antennæ, and not on the upper surface (compare figs. 96 and 100), but the antennæ of the second and third genera, *Zodion* and *Myopa*, are like the antennæ of a muscid, save that the bristle is shorter and thicker in proportion to the other joints (see fig. 100). Myopa may be distinguished from Zodion by its mouth, which is jointed, instead of being straight like the mouth of a Conops (compare figs. 99 and 100).

Conops.—The Greeks applied the word "conops" (κώνωψ) to biting flies of the Gnat kind, and therefore it is difficult to understand the reasons which prompted the entomologist, who first gave it to this genus; perhaps he did it on the logical principle of "lucus a non lucendo," since the Conopes are but very distantly related to gnats, and do not bite at all. Conopes only appear during the hottest part of the warmest days of July and August. They

frequent flowers—chiefly compositæ and umbelliferæ,—but they are not particular, as long as there are plenty of bees on the spot. Their manner of flight is very like that of the Hymenoptera: the commonest species, *C. quadrifasciata*, has almost exactly the same colours as a wasp, and, when flying, it looks so like one of those insects, that it might be called the "Wasp-fly" *par excellence*, were

Fig. 94. *Conops rufipes*, male, × 4 diam.

not the name already appropriated by several Syrphidæ. But the resemblance to a wasp ceases in some measure when the fly is at rest; for although it is about the same length (½ inch), the shape of the abdomen is different, being thicker at the end

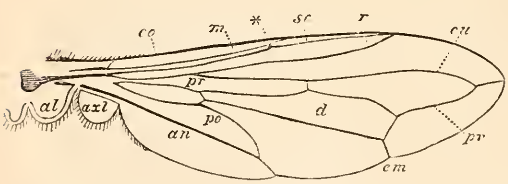

Fig. 95. Wing of *Conops quadrifasciata*, × 7 diams. Names of the veins:—*co*, costal; *sc*, sub-costal; *m*, mediastinal; *, point where sub-costal joins the mediastinal; *r*, radial; *cu*, cubital; *pr*, *pr*, præbrachial; *em*, externo-medial; *po*, post-brachial; *an*, anal; *d*, the discoidal areolet; *axl*, axillary lobe; *al*, alula.

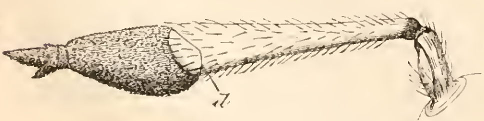

Fig. 96. Antenna of *Conops quadrifasciatus*. *d*, line showing shape of third joint.

than at the base, instead of being thick at the base and tapering to a point, as in a wasp. The abdomen of the male is longer, more slender, and has its black bands broader, than the abdomen of the female. The head is rather flat and broad—broader than any other part of the body, and the mouth is long and thin. The colour of the antennæ is black; they are of considerable length, and from their being carried during flight in the same position as a wasp carries its antennæ, the resemblance of the fly to one of those insects is greatly enhanced. Were it not for this, the likeness would not be great. The thorax is black, with a bright yellow spot on each shoulder; the abdomen is yellow, banded with

Fig. 97. *Myopa testacea*, male, × 4 diam.

black; and the legs are yellowish brown, with dark feet. The wings are nearly transparent, but the membrane becomes darker towards the fore border. A magnified drawing is given at fig. 95. On comparing it vein by vein with the wing of a Myopa,

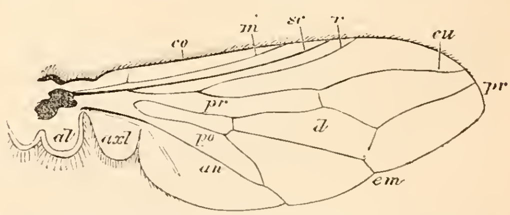

Fig. 98. Wing of *Myopa ferruginea*, × 8 diam. For names of veins see fig. 95.

shown at fig. 98, it will be noticed that the veins are almost identical, but that the general form is rather different: it is longer, more pointed, and far more elegant. The shape of the areolets also differs. The wing of a Conops varies towards the Syrphid type, that of a Myopa towards the Muscid. Both have the joining of the postbrachial and anal veins (*po* and *an*), a characteristic of the Syrphidæ and Pipunculidæ, which is not found among the Muscidæ. In the wing of the Conops, the mediastinal vein (*m*) near its end unites with the subcostal (*sc*) in a very curious manner, as at the mark*. We have never noticed this in any other fly. In the Conops, the cubital vein (*cu*) is joined by the præbrachial (*pr*) before it enters the margin of the wing; the areolet thus formed is identical in shape with the

corresponding areolet in the Syrphidæ: in the Myopa, this joining does not occur; and the areolet becomes like that of a Muscid.

Fig. 96 is a drawing of the antenna of *C. quadrifasciatus*. Although it has such a curious shape, it is really nothing more than a modification of the type found in the Muscidæ. This will be best understood by comparing it with the antenna of *Sepedon sphegeus* on page 105, in the May number of this magazine; and, at the same time it will be well to compare that of Myopa (fig. 100). All three of them will be seen to consist of:—firstly, a short basal joint; secondly, a long and hirsute second joint; thirdly, a shorter, broader, and smoother third joint; and lastly, a bristle, consisting of three small joints, which are short and thick in the Conops, but very slender in the other flies. (Through a little error in the woodcut, the Sepedon's antenna seems to have but two joints in the bristle: the second joint ought to have been divided into two at a distance of $\frac{1}{16}$ inch from its base.) The antennæ of a Conops are broad, but very thin. When viewed from above, they appear about half as wide as they do sideways.

Fig. 94 is an enlarged drawing of another species of Conops, *C. rufipes*, which, not so frequent as

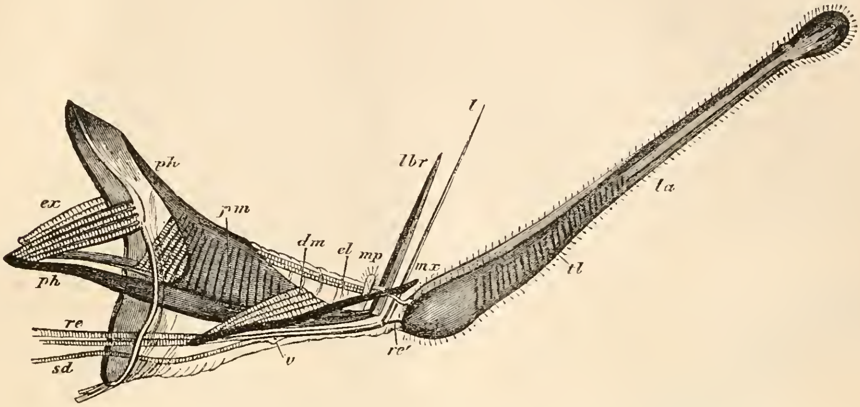

Fig. 99. Mouth of *Conops quadrifasciata*, × 20 diams. *lbr*, labrum; *l*, lingua; *la*, labium; *mx*, maxillæ; *mp*, maxillary palpi; *ph ph*, pharynx; *sd*, salivary duct; *v*, its valve; *ex*, exsertor muscles of the mouth; *re* re', retractor muscle; *pm*, pharyngeal muscle; *dm*, depressor of the maxillæ or labrum; *el*, elevator of the labrum; *tl*, transverse muscles of the labrum.

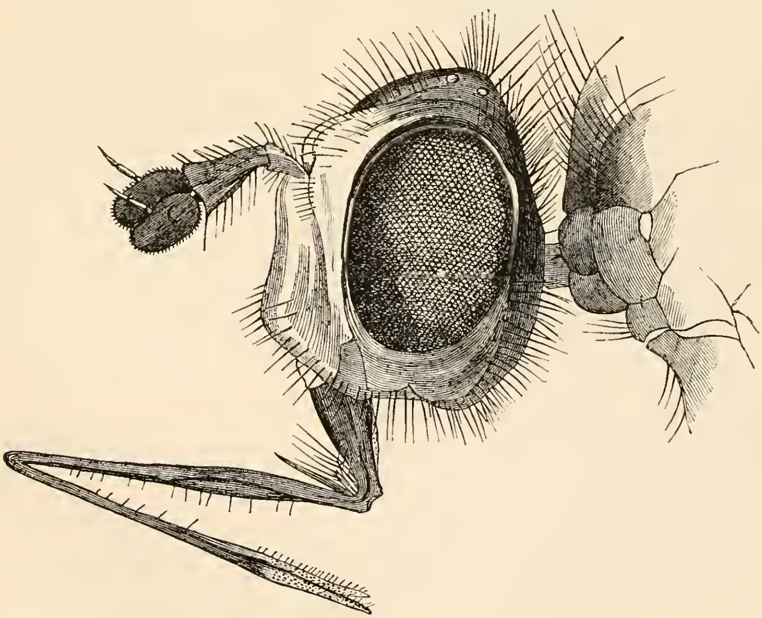

Fig. 100. Head of *Myopa atra*, × 40 diam.

the species just described, is yet likely to be met with. Although not so handsome as the former, it is more remarkable, its head being broader and flatter, its abdomen more slender, and its wings very prettily marked. The general colour of the insect is black, but the face is bright yellow, and the eyes reddish brown. The first and second segments of the abdomen, which are reddish brown in colour, are lengthened into a kind of footstalk. The remaining segments form, as it were, the head of a club, of which the first two are the handle; their colour is black, but the edge of each one has a fringe of yellow hairs. The wings have brown patches on them as shown in the figure, and the halteres are yellow and rather conspicuous.

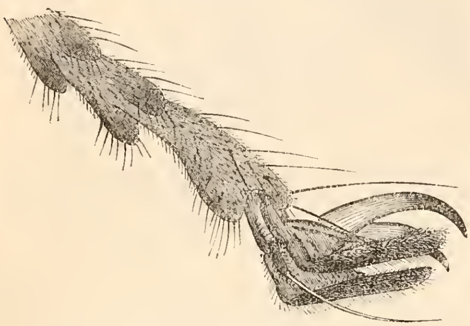

Fig. 101. Foot of *Myopa testacea*, × 80 diam.

The mouth of *C. quadrifasciata* is shown at fig. 99. It will be instructive to compare the drawing with figs. 29 and 53, representing the mouths of *Stomoxys calcitrans* and *Tetanocera Hieracii*. The most striking peculiarity is its length and thinness. The labrum (*lbr*) is short, and the lingua (*l*) is longer than the labrum. The maxillæ appear to be intermediate between those of the Syrphidæ, which are very long and of the Muscidæ, which are not found externally at all, for in the Conops they just project beyond the skin. It is doubtful, however, whether any *internal* organ can be properly called a maxilla, since the primary form of a maxilla, as is well known, is au *external* limb.

Zodion.—Flies of this genus are rare, and as we have never found any specimens we do not stop to describe them. They may be known from Myopæ by the peculiarity of the mouth before mentioned, and also by the præbrachial vein joining the cubital before entering the margin of the wing, just as in the genus Conops.

Myopa.—This genus is the commonest of the family, and as the student is likely to find any one of the five species, we give a table, which will render the identification an easy matter :—

Body rust-coloured and wings transparent ...	*M. ferruginea*, *M. fasciata*.
Wings spotted	*M. testacea*, *M. buccata*.
Body all black	*M. atra*.

M. fasciata may be distinguished from *M. ferruginea* by its having a black abdomen; and *M. testacea* from *M. buccata* by its having the transverse veins of the wings clouded with brown, which in the other are plain.

The first species named, *M. ferruginea*, is likest to a Conops, but it may easily be distinguished therefrom by the variations before mentioned. As its name implies, its general colour is that of rust, which indeed is the prevailing tint among Myopæ. In size and shape it is somewhat variable, being sometimes more than half an inch long, although generally less; but on the thorax there are always three longitudinal black stripes, which alone would serve to specify it. Its face is yellow, and not so protuberant as in the species next to be described. Its wings are nearly transparent. One is drawn at fig. 93, and its peculiarities have already been noticed when comparing it with the wing of Conops.

The most ridiculous of all our flies is *Myopa testacea*, which looks as if it were afflicted with violent toothache and rheumatism, for its face is swollen to a great size, and its abdomen and legs have most unexpected curves and twists in them. In colour it is rusty, but of a brighter tint than the preceding fly, and it is spotted in various places with a darker brown. The face is white, and the mouth projects from its swollen cheeks like a slender, jointed filament. An idea of the fly may be obtained from fig. 97, but it is only in a living specimen that its funniness can be appreciated; for its capricious movements contribute greatly to its oddity. It is far more active than *Myopa ferruginea*, which is so sluggish that it often allows itself to be caught with the fingers. Nothing of the sort may be expected from *M. testacea*, which will escape from the net if care be not taken to secure it. It varies greatly as to size, some specimens being only $\frac{3}{10}$ inch long, while others reach the length of $\frac{1}{2}$ inch.

The feet of both the genera Conops and Myopa are much alike, so one description will serve for the two. Fig. 101 shows a foot of *M. testacea* sideways, and just turned up enough to see the underside of the pads. It is not unlike the foot of an Asilus, for the pads are both long and square, and have large, perfectly straight tenent hairs. But there are no auxiliary pads as in an Asilus, and the bristle between the two large pads has no tenent hairs. The claws are long, well developed, aud sharp, but the bristles on the tarsus are mostly slender.

The next species, *M. atra*, is much smaller than the other two, being not more than $\frac{1}{5}$ inch long. It bears a strong resemblance to *Cordylura pubera*, drawn at page 61 of this year's Science-Gossip, a fly which we stated was not very distantly related to the Conopidæ; it is, however, different in the mouth and wings. The specific name of this

Myopa (*atra*) is not a false one, for, with the exception of the face, which is whitish, and the brick-red eyes, it is all black, or at least a very dark brown. The whole body is smooth and shining, and has fewer hairs than the other species. The wings are transparent, and the halteres white. Fig. 100 represents the head of this species, and by it may be seen how the antennæ and mouth differ from those of Conops. The mouth, besides having a joint in it, is pointed at the tip. The capillary channels of the lobes of the labium are five or six in number on each side. There are about the same number in the labium of a Conops. The maxillæ of Myopa do not project from the integument like those of Conops, but are quite internal, as in the Muscidæ. The maxillary palpi are very short, although not quite so minute as the palpi of Conops.

This and the other two species of Myopa are not so common as the two described first. *M. atra* we have found occasionally at Oxford, but *M. fasciata* and *M. buccata* we have never yet met with.

We are aware that these papers are very imperfect, especially in the matter of "life-histories"; but, as explained in the first paper, they are only intended as "Notes"; and if we may be so vain as to expect it, we hope that others may be induced by our remarks to take up the Diptera as a study, instead of traversing again the well-worn tracks of Lepidoptera and Coleoptera. A few more papers on orders generally neglected by amateur entomologists—the Diptera, Hymenoptera, or Orthoptera, for instance—would be a pleasing variety in what is generally known as "Entomology," and possibly more interesting than those "records of captures" of rare butterflies, of which enthusiastic "Lepidopterists" contribute so many to the pages of our entomological magazines.

F. J. Allen & H. M. J. Underhill.

THE "FLOWERS OF THE FOREST."

THE New Forest is not very full of wild flowers, the reason being that the herds of ponies and cattle eat down everything they can get at. But they do nothing to what the deer did in former days. A deer would eat a young fir-tree off close to the ground, besides keeping down all the herbage it came near.

May is the month in which really to enjoy the New Forest; the colours are so varied, the air so fresh, and the troublesome forest flies not yet come out. It is true, May this year has been very cold, and a bitter east wind has kept the foliage back. We had driven southwards in our pony-trap, from the borders of Hertfordshire, in hopes of finding warmer weather, and near Lyndhurst the sun was warm enough for wandering in the forest to be very pleasant.

The beeches were out in fullest and freshest leaf, the oaks scarcely in leaf at all. The way in which the hollies grow is beautiful; they have none of the stiffness and formality we are apt to associate with them, and do not look prickly. They climb across the beech stems, and, growing up between their strong arms, throw out long graceful trails amongst the young green of the beech leaves. Some hollies that I saw grew actually from out of the trunk of the beech tree, and formed part of it. My companion cut several capital walking-sticks from upright shoots of hollies.

The ferns had scarcely begun to unfold, but there were beds of wood-sorrel growing thinly over the dead leaves. I found some that had a bright pink blossom with darker lines.

The mosses in the bogs were brilliant in vivid shades of green, set with ruby patches of sun-dew (*Drosera rotundifolia*) not yet in blossom. The sun-dew's hairy little leaves were at work catching flies. I brought a specimen home, in which the poor fly struggled in gummy toils until its death.

Wild moorland tracts were bright with gorse. Nowhere before had I seen this blossom in such splendid masses of colour; where there was no gorse the moor was somewhat dull and brown with last year's heather, but much enlivened by the red catkins of "sweet gale," not yet in leaf, and the little creeping willow. There were beds of water ranunculus in the streams, and many water-lily leaves in quiet corners.

The bilberry, with its pretty pink blossoms and very light leaves, grew thickly under the trees nearly everywhere in the forest. The may was scarcely out, but crab-apple bushes were in full blossom, and looked specially bright upon the bleak commons. One of the gayest "Flowers of the Forest" was *Pedicularis sylvatica*, whose English name is so ugly; we found it all through the Forest and in the marshes, often looking "eaten down," but always cheerful, gladdening us with rose-colour where no other flowers seemed to grow.

One of our pleasantest botanical finds was on a bare tract of country on our way from Beaulieu to Boldre. There was nothing to enliven apparent desolation except gravel-pits, which had filled with water and were covered with the leaves of aquatic plants. As we drove quickly along we caught sight of a shallow pond covered with a light-coloured erect blossom. It proved to be the buck-bean (*Menyanthes trifoliata*), with trefoil leaves and spikes of lilac flowers growing out of the water.

In the woods near Minstead were beds of lilies of the valley in full blossom, which seemed to be growing wild; but we found they had been introduced by some one at the Mansion-house.

One morning we spent at Beaulieu; and although the tide was low, leaving a wide expanse of mud, we could still enjoy the beauty of the place. We

rested in a copse by the river side, of which the underwood was all broom in blossom. One of the commonest flowers about Beaulieu is the dark blue lithosperm, which grew in profusion in the woods and hedges. Inside Beaulieu Abbey is a space of smooth green turf, surrounded by the remains of cloisters and conventual walls. This space is carefully kept as a pleasure garden, and the old buildings honoured and preserved as much as possible. A number of loose pieces of carving and stones have been collected together and made into a low wide heap. This has been planted with many kinds of rock plants and bright spring flowers. *Daphne nemorum* looked charming, and many alpine plants grew freely. This rock garden and the flowers which were encouraged to grow in the ruined corners and walls were as pretty a sight as any in Beaulieu.

We were not fortunate in finding orchids. There were *Orchis mascula* and *Orchis morio;* also we found one specimen of *Listera ovata*, but half of it had been bitten off by a cow.

Primroses and dog violets, anemones, and hyacinths grew in the forest, but not profusely, except in some of the smaller enclosures.

Although not conducive to botany, the ponies with pretty little foals beside them, and the quiet, contented cattle wandering out of the thickets and across the heaths, were very amusing, and added much to the life of the forest scene. Even the black pigs, with their large families, were pleasant to see; they were quite clean and nice-looking, with no superfluous fat about them.

On our road home we found the meadow saxifrage (*Saxifraga granulata*) by the roadside, near Whitchurch; and at Kingsclere, Solomon's seal in blossom was growing thickly in the woods and ditches, and very beautiful it looked. Golden saxifrage (*Chrysosplenium oppositifolium*) grew here also.

Stopping on our last day to rest at Maidenhead Bridge, I happened to turn for amusement to a number of the *Graphic* which lay in the hotel. There was a great deal about the month of May, and a string of verses which set forth how a charming young lady in a "Dolly Varden" hat, looked into somebody else's eyes "that morning in Maytime," when "pale primroses peeped from the green of the hedges, and poppies flamed red in the ripening wheat." Very pretty, no doubt, but the writer can hardly, I fear, have consulted "Bentham" as to when poppies bloom and wheat ripens.

Pinner Hill. M. A. TOOKE.

"Let the warfare of Science be changed. Let it be a warfare in which Religion and Science shall stand together as allies, not against each other as enemies."—*White's "Warfare of Science."*

THE HEDGEHOG.

(*Erinaceus Europæus.*)

THE Hedgehog—one of our commonest and most familiar wild animals—belongs to the order *Insectivora*, which order includes three groups of common British animals: the *Talpidæ*, or moles; the *Soricidæ*, shrews; and *Erinaceidæ*, to which last the Hedgehog belongs, being the sole representative of the family, as is the mole of the British Talpidæ, while the shrews have a large and widespread representation, including natives of all the Old World and of North America.

The habits of the Hedgehog are nocturnal, sleeping during the day in the stump of a tree, in the rubbish at the foot of a hedge, or in some similar place where it can nestle amongst dry leaves and moss. It, towards night, when it is growing dusk, leaves its hiding-place, and rambles along the damp meadows in search of its food, consisting chiefly of snails, beetles, and any other insects it may discover, hunting by scent—a sense which, in the Hedgehog, is well developed. Its food, I have said, consists *chiefly* of insects; but I think that there is no doubt of the carnivorous habits of the Hedgehog, both from the observation of other subscribers to SCIENCE-GOSSIP, and from those I have made myself. Gamekeepers say that it will destroy the eggs of game, and that it will even surprise the young when first hatched, and therefore no mercy is shown when it is accidentally snared or trapped. Hedgehogs that I have kept have always preferred raw meat to bread and milk, though they would eat but sparingly of cooked meat, and preferred snails or worms to either.

The teeth of the Hedgehog are admirably formed for crushing the shells or elytra of its insect prey. The incisors are sharp, with a slight outward inclination, which increases in old subjects; the molars are short and strong, and surmounted by sharply-pointed projections, or cusps, which, of course, prevent true mastication, the food being crushed and swallowed in jerks in the case of slugs or worms, while with larger insects the paws are used to steady the mass while morsels are torn off and disposed of.

The structure of the spines is noticeable, affording an instance of the same arrangement of material to form a tube, which is to combine strength with extreme lightness, as we see employed in the structure of iron spars and pillars. If a transverse section of a spine be made, we shall see a hard exterior ring of a quill-like substance, to which projections of the same material, radiating from the centre, are attached. The interstices are filled in with a porous pith-like mass, forming an elastic cushion. Exteriorly the spine is shaped like the yard of a ship, and tapers to a sharp point at the

unattached end. The root is formed by a slightly-knobbed projection, which passes through the skin, and is inserted into the fascia of a broad, flat muscle, forming a band extending beneath the whole spine-covered surface, and by means of which the spines can be simultaneously raised, and kept stiff and unyielding when the animal curls itself into its characteristic defensive attitude. These spines are possessed by the young from birth, though for a short time they have more the character of thick coarse hair, which gradually hardens to the consistence of spines. At three weeks old the young, generally three to five in number, and born in July or August, are quite able and sometimes is fastened to the pole of a carriage to prevent the horses rubbing against it; but these are the only uses to which the Hedgehog is put in England, though I believe it is eaten in some countries by the poor, and perhaps in our own by the gipsies.

This is but a very short and bare summary of the natural history of the Hedgehog, but it may prove interesting to some few of those contributors to SCIENCE-GOSSIP who have lately been inquiring about the habits of the animal, and from whose answers I have gathered several new facts in relation to its life history.

CHAS. W. WHISTLER.

Fig. 102. Common Hedge-hog (*Erinaceus Europæus*).

to follow the wanderings of their parents, of whom they are exact miniatures in every respect, and are quite as well protected. How long the life of a Hedgehog lasts is not, I think, determined. Those which are kept in captivity seldom live for long, perhaps because unnaturally deprived of the long period of winter dormancy by the warmth of the kitchens in which they are generally kept to destroy the beetles.

In common with the other British Insectivora the "Urchin" has been the object of several mistaken notions, among which is the idea that it robbed the cows of their milk whilst sleeping. This is still believed in some parts of the country, and may be classed with the superstitious dread of the shrew, and the old belief in its hurtful touch. The skin is used sometimes as a muzzle when weaning a calf,

THE MICROSCOPE AND MICROSCOPIC WORK.

No. VIII.—By F. KITTON, F.R.M.S.

IN the previous number it was suggested that the correspondent "A. Y." of the *Gentleman's Magazine* might be identical with the M. Joblot mentioned by Mr. Baker. This we are now inclined to think is not the case.

M. Joblot published in 1718 his "Descriptions et Usages de plusieurs nouveaux Microscopes tant simples que composés, avec de nouvelles Observations faites sur une Multitude innombrable d'Insectes," &c. 4to. pp. 174, plates 34. Thirty-six years after appeared the "Observations d'Histoire naturelle faites avec le Microscope sur un grand Nombre d'Insectes et sur les Animalcules qui se trouvent dans les

Liqueurs préparées et dans celles qui ne sont pas," &c. 4to. pp. 267, plates 53.

It is scarcely probable that two observers should have detected the "Satyr." We may therefore conclude that "A. Y." palmed off on Mr. Urban a copy of M. Joblot's animalcule as his own, a trick not unknown even to the editor of SCIENCE-GOSSIP.

Dr. Lardner, in his work on the Microscope, gives a figure of the Satyr, copied from a drawing of Dr. Young, differing but little from Mr. Baker's, and says it is the "amymone satyr of Müller."

In 1754 a small work made its appearance, which promised to give an abridgment of all that had been written by the best authors concerning the more curious objects, with the precautions necessary to be taken to make the observations successful. This book was written in French, and called "L'Exercise du Microscope." The author, however, was an English optician of the name of Watkins, living at Charing Cross, London.

The author describes the usual microscopic objects, and, like most of the "microscopists" of the period, he was opposed to the theory of spontaneous generation. As a specimen of his style, we quote the following passage from his chapter "*De la Génération des Insectes & des Végétaux*:"—

"C'est sur le sujet de la génération des Insectes & des Végétaux, que les Hommes se sont trouvéz embroillez dans un Chaos de Tenebres & de Confusion dûquel on n'auroit jamais pu se debarasser sans le secours du Microscope. Ne faut-il pas en effet être plongé dans l'Ignorance la plus grossiere & la plus absurde que de s'imaginer que la Putrefaction & l'Ordure avec l'Aide du Hazard pouvoient produire des Millions de Creatures vivantes de diverses Especes & former toutes les Parties necessaires pour les Fonctions de la Vie & leur donner l'Intelligence de chercher la Nourriture propre pour continuer leur Existence? Cependant quelque etrange qu'une telle Opinion nous paroisse à present, le Tems a été quand ces Idées, toutes absurdes quelles sont etoient etablies & receues non seulment des Gens sans Lettres mais aussi des Philosophes les plus savans & les plus eclairez des Siecles passez."

A little further on we find the following remarks on Spermatozoa:—

"On a decouvert par l'Assistance des Verres que le Semen masculinum des Animaux est rempli d'un Nombre infini de petites Animalcules, pleines de Vie & Vigueur, quoiqu'elles soient d'une Petitesse si extréme, que trois milles Millions n'egalement pas la Grosseur d'un seul Grain de Sable. On trouve ces Animalcules à peu près de la même Forme dans toutes les differentes Especes d'Animaux ayant le Corps d'une Figure ovale & la Queüe très longue en Comparison du Corps. . . . Il est très facile de decouvrir ces Animalcules dans la Laite d'un Poisson, on n'a qu'à presser le Poisson tant soit peu vers le Ventre & il en sortira de la Laite dont la Grosseur de la Tete d'un Epingle suffira."

In the following year (1754) was published "An Account of Some New Microscopical Discoveries." This book was dedicated to the President (Martin Folkes) and Fellows of the Royal Society by the author, T.N. (Turberville Needham).

In this work, he propounds this theory, that "a Drop of Water the Diameter of which exceeds not a line may be a Sea not only as daily experience shews in the Capacity which it has of containing and affording Sustenance to Millions of Animals, but also in the Similitude which these very Animals may bear to several known Species in that part of the Creation which is the Object of our naked Eyes. A microscopical Animal may therefore in Shape and relative Magnitude be to numberless Inferiors what an Elephant, Ostrich, or Whale is in the several Kingdoms of Beasts, Birds, or Fish. . . . . Some general Reflections of this nature succeeding to those late Wonderful Discoveries of the Properties of the Fresh-water *Polype*, for which the world is obliged to the ingenious Mr. Trembley, induced me to examine if no Species of Fish could be found in the Sea, which, bearing a near Resemblance to it, might be almost in Large what this is in Miniature, and serve by Induction to clear up those Phenomena at least which escape our Apprehension upon account of the Minuteness of the Object."

Mr. Needham devotes 59 pages to a description of the Calamary. A very good figure is given of the lingual band. He describes the teeth upon it as follows:—"A curious Arrangement of new Rows of Teeth invests in a manner the whole Expansion on one side of a thin transparent Membrane to which they adhere. The Area of this Membrane, tho' it be so minute in a Calamary of the largest size as not to exceed half an Inch in Length and one Tenth of an Inch in Breadth, yet affords sufficient space to contain without confusion five hundred and four Teeth of several Shapes, each Row being composed of fifty-six."

The chapter on the *Farina fœcundans* (Pollen) is very interesting, and reminds the reader of the painstaking investigations of Leeuwenhoek. The author's dissections and microscopic examinations soon satisfied him that the explanations of M. Tournefort and others respecting the use of the stamina in flowers was incorrect. Their theory was that the stamens were a kind of excretory ducts, and that the pollen was the excrement of the food of the fruit or embryo plant discharged by filtration.

This theory was, however, opposed by Mr. Morland, M. Geoffroy, and others, who "found a nobler use for it, and were of an Opinion which appears to be the most agreeable to Truth, that it is this Dust which, falling on the Pistil, impregnates and fecundifies the Grain or Fruit inclosed therein and hence it is called *Farina fœcundans*."

In chapter XII. is an inquiry as to the nature of the supposed embryo sole found upon a species of shrimp.

"It is generally believed upon the coasts of *England* and *France*, that *Soles* are produced by means of a certain Species of *Shrimp* or Prawn, which differs from the ordinary Sole, being of a lighter Colour and much more transparent. I find the same Opinion current among the Fishermen in *Portugal*, where this kind is known by the name of the Sole-bearing Shrimp."

Mr. Needham does not, however, believe in the truth of this assertion, although M. Deslandes, in the Memoirs of the *Royal Academy of Sciences*, 1722, says that he took a considerable quantity of these shrimps and preserved them alive in a quantity of sea-water, where, after the space of twelve or thirteen days he found eight or ten little *soles*. He repeated the experiment several times, always with the same success. He could never succeed in obtaining young soles from the spawn deposited in the vessel in which he had kept some soles a considerable time; from whence he concludes that the spawn of the Sole requires the assistance of the Shrimp to hatch it. The author's figure of the supposed sole embryo represents a maggot-like organism, consisting of nine segments, one of which (representing, probably, the head) is about one-third of the length of the whole form; the remaining eight are equidistant, and apparently armed with a short spine or claw on each side. The author says they are legs, and that the size of the insect is about that of a grain of coarse sand.

Contemporary with Baker and Needham was George Adams, senior, the author of "Micrographia Illustrata; or, the Knowledge of the Microscope explained, with a Translation of M. Joblot's Observations on the Animalcula found in many Infusions, and an Account of the Fresh-water Polype, translated from the Treatise of Mr. Trembley. 4to, pp. 263, plates 65. London: 1747."

Twenty-four years afterwards, the fourth edition of the above-named work was published. This was an 8vo. of 325 pages and 71 plates.

In 1787, George Adams, junior, produced his Essays on the Microscope, containing a practical description of the most improved microscopes, with a general history of insects. 4to, pp. 720, plates 26. A second edition of the Essays, with considerable additions and improvements by F. Kaumacher, appeared in 179 The considerable additions consisted of four extra pages and six plates.

Mr. Roper, in his valuable Catalogue of Works on the Microscope, says that "the earliest work I have been able to meet with on microscopical subjects is Petrus Borellus: 'De vero Telescopii Inventore, cum brevi omnium Conspiciliorum Historia; accessit etiam Centuria Observationem Microscopicarum.' Small 4to. pp. 188, woodcuts. Hague, 1665—1656."

But as Borellus dates the invention of the Microscope as early as 1590, it is probable some of the discoveries made with it were published previously to the appearance of Borellus's book. According to the Catalogue just quoted, 115 works on the microscope and microscopic works were published between 1656 and 1799, several of them reaching to third and fourth editions.

The discoveries of most value were those made by the simple microscope. The observations made by its means were not liable to the errors which the "double" instrument almost always caused the user to fall into. This is very clearly shown in the work done by Leeuwenhoek.

We append his epitaph, which a correspondent communicated to *Notes and Queries* (p. 292, vol. iv., series iv.):—

"Piæ et æt. Mem. Antonii A. Leeuwenhoek Reg. Angl. Societ. Membri, qui Naturæ penetralia es physices arcana Microscopiis ab ipso inventis et mirabile arte fabricatis, assiduo studio et perscrutatione delegenda et idiomate Belgico describenda de toto terrarum orbe optime meruit. Nat. Delph. xxiv. Oct. a MVI^c^XXXIJ. Ibidemque Denat. xxvj. Augusti a MVIJ^c^XXIIJ. Patri charissimo hoc monumentum filia Maria A. Leeuwenhoek moerens P."*

(*To be continued.*)

THE RESTING-SPORES OF THE POTATO-DISEASE FUNGUS.

By Worthington G. Smith, F.L.S.

IT is with much pleasure that we lay before our readers the following important paper by Mr. W. G. Smith, copied from the *Gardeners' Chronicle*.

"The resting-spores found by me in the diseased Chiswick potatoes last July have now, after nearly a whole year's rest, germinated and reproduced the fungus which causes the Potato disease. I propose to publish my observations, with illustrations, but before doing so, it may be well to briefly glance at the diverse opinions expressed in different quarters as to the possible nature of the much-discussed bodies referred by me last year to the resting-spores of the Potato fungus.

"My judges, though numerous, have been the reverse of unanimous, but they have nearly all been friendly and just. Had my critics been unanimous in considering my resting-spores as belonging to some other known fungus distinct from *Peronospora infestans*, I should have looked on my first observations with great distrust. Strangely enough, how-

* Leeuwenhoek is buried in the old church at Delft.

ever, not only did many botanists at once differ from my interpretation of the meaning of the bodies found in diseased Potato plants, but the same botanists differed from each other quite as much as they differed from me. This fact, if it proved nothing else, at least proved that the bodies under discussion were new and unfamiliar.

"My first published illustrations of the secondary condition of the Potato fungus were printed in the *Gardeners' Chronicle* for July 17, 1875, pp. 68 and 69, and (making allowance for the very slight and insufficient material then at my command) these figures may be taken in the main as fairly correct representations of the early state of the resting-spores. My illustrations bear a certain resemblance to fig. 104, which represents a fungus named provisionally *Pythium incertum* by Mr. Renny. My plant was, however (setting aside the anatomical differences), uniformly about one-third larger in all its parts.

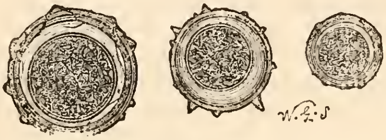

Fig. 103. Condition of resting-spores from the 1875 potato-leaves in April, 1876. Enlarged 400 diameters.

"Fig. 103 represents the condition of my Potato resting-spores whilst still at rest, and before any germination had taken place, drawn in the month of April last.

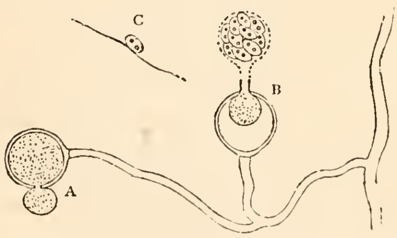

Fig. 104. *Pythium incertum*, Renny. A, oogonium discharging its undifferentiated protoplasm; B, oogonium discharging its protoplasm in the form of zoospores; C, zoospore free. From the original materials. Enlarged 400 diameters.

"Fig. 104 is Mr. Renny's *Pythium incertum.* It more or less agrees (as do all the other species of *Pythium* here described) in its anatomical character, with *P. equiseti* described and illustrated in the *Gardeners' Chronicle* for May 27 last. Mr. Renny some time since expressed an opinion that this plant and mine were identical, but *P. incertum* is smaller in all its parts, has non-septate instead of septate (jointed) threads, and, as far as was seen. *P. incertum* carried no male organs (*antheridia*). Moreover, *P. incertum* produced no resting-spore, but continually broke up into zoospores, and so reproduced itself. It did not grow upon potatoes.

"Fig. 105 is the famous *Pythium equiseti* of Dr. Sadebeck, said to be found upon potatoes and equisetum. This species was at first considered as possibly identical with the bodies discovered by me, and the original figure is here reproduced to show the septate threads and other characters. The upper figure, A, is remarkably like *Artotrogus;* the figures B, C, D have *antheridia* 'in local, but not in anatomical relation with each other'; whilst at E and F may be seen *oogonia* and *antheridia* 'free in the surrounding space.' De Bary, in criticising a similar figure of mine, says, 'These phenomena entirely disagree with all that is yet known of *Peronosporeæ* and *Saprolegnieæ*'; yet Dr. Sadebeck and myself have seen and figured exactly identically the same 'phenomena.' *P. equiseti* has been proved to be different from my organisms.

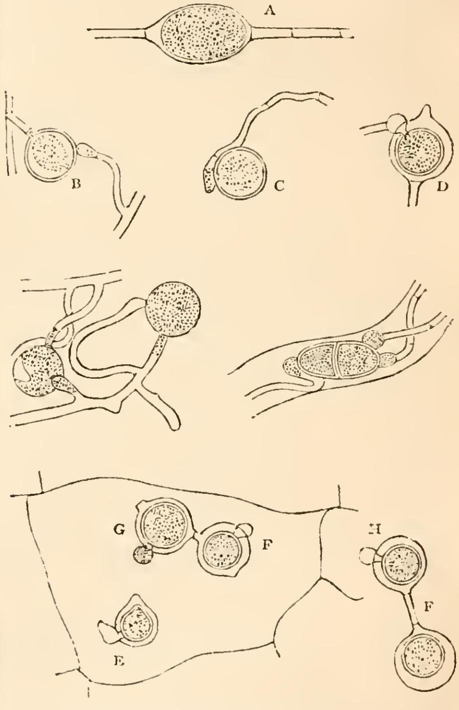

Fig. 105. *Pythium equiseti*, Sadebeck. From Dr. Sadebeck's original illustration. Enlarged 400 diameters.

"Fig. 106 is the new (?) *Pythium vexans*, found by De Bary in collapsed potatoes. It is described by the author as a new species, because it differs from all similar organisms known to De Bary in its small size and in the peculiar insertion of the oogonium and antheridium. My readers will see at a glance that this fungus is no smaller in any of its parts than the two last described; and as for the peculiarity of the insertion of its oogonium and antheridium, A, B, in De Bary's fig. 106, do not differ from F, G, H, in Dr. Sadebeck's fig. 104. *P. vexans* (fig.

106) has produced no hybernating resting-spore. An opinion has been expressed that there is no difference between De Bary's *P. vexans* and the organisms described by me; but De Bary himself says, in criticising me, that I have described 'two forms of fungus—both different from the Potato fungus, and

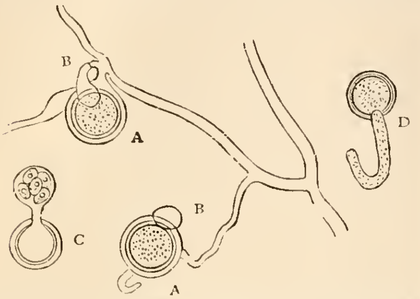

Fig. 106. *Pythium vexans*, De Bary. A, A, oogonia; B, B, antheridia; C, oogonium discharging its contents in the form of zoospores; D, oospore germinating by sending out mycelium. Enlarged 400 diameters. From De Bary's illustration and slide No. 8.

possibly also from each other,' and that my resting-spores may rather be compared with the 'thin-walled oospores of *Peronospora viticola*,' than *P. arenariæ*, to which I compared them.

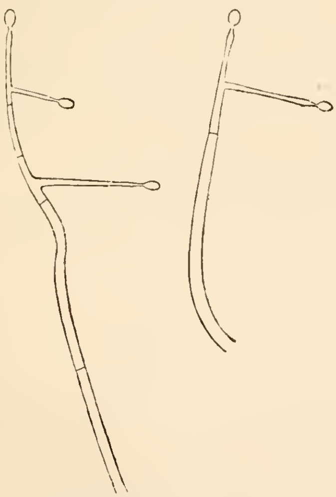

Fig. 107. *Peronospora infestans*. Conidiophores, reproduced from the *Gardeners' Chronicle*, July 24, 1875. Enlarged 250 diameters.

" *Pythium proliferum*,* De Bary, is reproduced from De Bary's original plate, because Max Cornu, on examining my preparations, wrote me that he had seen very similar resting-spores with mine in *P. proliferum*. This latter plant is more like my organisms than either of the others just described, but it differs totally in its general habit and non-septate threads. Max Cornu wrote me that my oogonia also reminded him of those found in the genus Myzocytium of Schenk.

" Dr. Wittmack, together with Professor Kny, Dr. Oscar Brefeld, and Dr. Magnus, all of Berlin, have examined my preparations, and write of the resting-spore: 'We all don't venture to say what it is. It looks so much like a Pythium, and has also so many resemblances of [to] Peronospora, that without studying the whole evolution, it is too difficult to decide the matter. Most oospores of Peronospora are a little larger, yet I find those of *P. pygmæa* of the same size nearly as on your slide.' Unlike my other critics, De Bary will not accept my observations; he even prints 'oogonia' and 'antheridia" in inverted commas; he says no botanist could accept the mycelium of Peronospora as I show it;

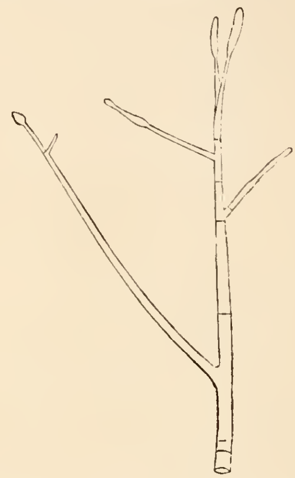

Fig. 108. *Peronospora infestans*. Conidiophore, from De Bary, "Ann. des Sc. Nat.," ser. 4, vol. xx. pl. 5, fig. 2. Enlarged 250 diameters.

that it is better to leave my figures out of consideration, and that I do not even accurately know the conidiophores (threads which support the spores). In support of the latter statement, he refers to the *Gardeners' Chronicle*, July 24, 1875, fig. 19, and says the conidiophores 'present an important difference from those of the real *P. infestans*.' The conidiophores from that figure are here reproduced (fig. 107). A momentary view will show that I never intended to illustrate typical fruiting branches of the fungus, but just any such accidental ill-grown pieces as happened to be on the preparation. But if these two outlines are to conclusively show my ignorance of the conidiophores of the Potato fungus, what are we to say to De Bary's own figure—also here reproduced, fig. 108, and taken from the 'Annales des Sciences Naturelles,' series 4, vol. xx. plate 5, fig. 2? If one figure is correct, the 'important difference' of the other is not very apparent, especially when the conidiophores were not described by me at all, but a reference was merely made to the secondary condition of the Peronospora.

* A large figure of this fungus appeared in the *Gardeners' Chronicle*.

"When I wrote my original description of the resting-spores of *Peronospora infestans* for the *Gardeners' Chronicle* I stated distinctly how I obtained my results. Mr. C. Edmund Broome, M.A., F.L.S., of Batheaston, last autumn repeated my experiments with diseased Potato leaves, and he obtained results exactly the same with mine. From last July till now Mr. Broome and myself have fortunately been able to keep these hybernating resting-spores alive."

FERN COLLECTING ON CHURCHES.

THE notes which are here presented, and which perhaps will be interesting to the readers of SCIENCE-GOSSIP (especially to those young naturalists who are wondering where they could best spend the time they have for rambling this season), were made during a ramble along part of the Norfolk coast from Burnham to Cromer. This coast, as is well known, is not so attractive as other parts of the country, but, like every other part, there are many objects of attraction, which a lover of nature could not fail to be pleased with; some of which, perhaps, we shall hint at in passing.

Making Burnham the starting-point, naturally enough the old town church was the first to come under the eye. After a very little trouble the Rue-fern (*Asplenium ruta-muraria*) was taken in an excellent condition; proceeding then down a lane, known as Friars-lane, the old church of Burnham Norton was inspected, and there grew abundantly the Rue-fern, also several of the black Spleenwort (*Asplenium adiantum nigrum*), some of which were taken. Going back again by Friars-lane to Burnham Overy church, where the Rue-fern was growing very copiously, we rambled then from the church to the beach, and were not a little interested in collecting the numerous species of shells left by the tide, which we scarcely dare attempt to name, unless it were such common types as (*Cypræa europæa*, or *Nassa reticulata*), and now and then finding geological curiosities in the form of a piece of jet, or, what seemed more rare, amber. Just inside the large range of sand-banks are abundance of the common "cockle" (*Cardium edulis*), which in its season is collected in large quantities. Whelks are also plentiful, and those peculiar creatures known as star-fish. One peculiar use to which the star-fish is put in that neighbourhood is to pierce a hole through the body, and place the stem of a young plant, such as a cabbage, through, and plant the cabbage surrounded by the animal, which seems to be sufficient manure to produce what is desired.

There is one thing worth noting in connection with this part of the coast, to observe how the sea at one time has left the land: it was found by personal observation that in less than twelve months, vegetation (*Carex arenaria*) had approached seven yards nearer the sea. At Hunstanton, about twelve miles westwards from this point the sea encroaches; so much so, that the fall of cliff a few years since was estimated at two thousand tons weight.

Passing on to the famed Holkham, with its magnificent Park, inside which the church is pleasantly situated, it was gratifying to take specimens of the Rue-fern. At Wells, we could find none. At Warham, about two miles farther east, the Rue-fern and a few plants of the common Harts-tongue (*Scolopendrium vulgare*) were abundant enough. Going on still in the same direction to Stiffkey, and alone upon the church the common Polypod (*Polypodium vulgare*) was collected. At Morston, we collected *Polypodium vulgare* and *Scolopendrium vulgare.* Through some cause Blakeney church was missed, and no more were collected, until the fine old ruins (a part of which forms the present worshipping place) of Cley, where the Rue-fern only appeared. It now happened that night was mastering us, and not being able to obtain lodging at Salthouse, we had to walk on to Weybourne; and well we remember what a rough and strange country it was. Our guide map was of no service whatever, as it was too dark. However, we reached the place and obtained lodging, scarcely thinking on the following morning of the previous evening's walk. Some fine old ruins were visited here covered with ivy, and in a rather bare place were a great abundance of wall-flowers in blossom. A few plants of *Scolopendrium vulgare* were found upon the ruins.

The morning was exceedingly fine, and we were drawn again to the sea-side, and found ourselves upon the top of the cliffs at Lower Sheringham, and descending to the beach, it was an easy matter to go with the boats and take crabs, for which the place is noted. It is strange to notice the beach covered with black pebbles uniform in size, and upon which strange pedestrians find no small amount of difficulty in walking. It is easy to imagine what a sound is produced by the breakers when the tide is coming in.

Being so interested, we passed the church, and, almost before being aware of it, found ourselves at Beeston; visited some old ruins known as the Priory, covered with ivy, of which there was a gigantic specimen. Upon the church the Rue-fern and a few specimens of *Asplenium adiantum nigrum* were growing. At Runton, farther on, the Rue-fern, *Asplenium adiantum nigrum*, and *Polypodium vulgare* were growing abundantly.

Passing along by the sea-side to Cromer, which was made the centre from which parts of the surrounding neighbourhood were visited, the black pebbles had entirely disappeared, and the beach consists of sand and small stones, searching amongst which we were rewarded by finding some very nice cornelians, which are still with us in a polished

state; and it was interesting to spend a few hours in search of lobsters only a short distance from the land. These lobsters are said to be found, among other places, in the remains of the church of ancient Cromer, now completely submerged. Upon the present church, part of which is in ruins, the Rue-fern seemed very happy.

In going from Cromer to Overstrand by the cliffs there is study for the young geologist; and along the beach there are what are known as "sinking" or "slip" sands, which in some cases have proved fatal. About the time we wrote, an unfortunate young lady sank in the sand, and was extricated only at the cost of life; the old lighthouse was entirely swallowed by the same agency. Upon the church and ruins at Overstrand abundance of *Polypodium vulgare* and *Scolopendrium vulgare* were found; at Northrepps the same two, and two or three plants of *Asplenium trichomanes*, as well as the Rue-fern; at Antingham the Harts-tongue only appeared; and farther on, at North Walsham, the favourite Rue-fern was plentiful enough on the church. This, with the exception of a short stay at Holt, finished our rambles. Not a single specimen of the common *Ceterach* or *Asplenium marinum* was found, and only about three specimens of *Asplenium trichomanes*. But in all the instances named above was that charming little Rue-fern, usually growing on the side of the church towards the north or east.

And after observing the habitats of this fern it might be suggested that in growing it—which often puzzles fern collectors—old mortar-rubbish and broken bricks might be advantageously used.

J. T. R.

MICROSCOPY.

The Nicaraguan Ants and their Food.—At a recent meeting of the Linnean Society, Mr. Francis Darwin read an account of some researches of his on glandular bodies on *Acacia sphærocephala* and *Cecropia peltata*, serving as food for ants. The structures in question were discovered by Mr. Belt (Nicaragua), and mentioned by him in his "Naturalist in Nicaragua," and subsequently further observations made by Fritz Müller (Brazil), while Mr. Darwin has more particularly entered into their minute composition. In Acacia, they are of two kinds: (*a*) nectar-secreting glands situate at the base of the petiole; (*b*) small, somewhat flattened, pear-shaped bodies, which tip six or seven of the lowermost leaflets of the bipinnate leaves. In Cecropia cylindrical bodies are developed in flat cushions at the base of the leaf-stalk. Mr. Darwin shows the microscopical structure of all of these to be homologous in kind,—cellular protoplasm, and containing oil-globules. He infers, moreover, they bear a relation to the serration-glands of Reinke, in certain cases afterwards being converted into stores of nutriment, which undoubtedly the ants live on, and in their turn protect the trees from the ravages of the leaf-cutting ants.

The Quekett Microscopical Club have just issued their thirty-first number, containing valuable papers by Mr. James Fullagar, "On *Actinophrys Sol*," a continuation of the article contributed to Science-Gossip in May, 1875; "On a Larval Cirripede," by Mr. H. Davis; "On the Metamorphosis of the Crane-fly and Blow-fly," by Mr. A. Hammond, whose papers and illustrations of these and collateral subjects will be well remembered by readers of our own journal, as having frequently appeared in it; "On a New Aulacodiscus," by A. Cottam; "On a New Method of cutting fresh-frozen Tissues," by R. P. Williams; "On a new Stage Arrangement," by N. E. Green; and last, but not by any means least in point of importance, a paper by Mr. M. H. Johnson "On Silicified Structure in Pyritized Wood."

The Royal Microscopical Society.—This well-known society have done themselves credit, in conferring an honorary fellowship upon Mr. Frederick Kitton, whose able articles on the "History of the Microscope" are now appearing in Science-Gossip. Mr. Kitton is known among microscopists all the world over as an authority on the *Diatomaceæ* and unicellular algæ generally.

The Lowest Forms of Plant-life. — The formation of cheese has lately engaged the attention of Prof. Ferd. Cohn in connection with his researches on the lowest forms of plant-life; and he has made personal observations on the manufacture, as carried on in Switzerland. The phenomena accompanying the process are thus described:—The rennet contains a liquid ferment which causes coagulation of the milk; also ferment-organisms (*Bacillus*), which probably bring on butyric-acid fermentation, and cause the slow maturing of the cheese. It is their resting-spores that, enclosed by the dry cheese substance, resist boiling heat for a long time, and, in a suitable nutritive liquid, may afterwards develop to bacillus rods. One of Dr. Bastian's results is in this way explained.

The Origin of Life.—In an important paper recently read before the Royal Society by Dr. Bastian, giving an account of some further researches "illustrative of the Physico-chemical Theory of Fermentation and the Condition favouring Archebiosis in previously-boiled Liquids," the author sums up as follows:—"The experiments in which liquor potassæ is added to urine in definite proportions before and after it has been boiled with

the result of inducing fermentation in the otherwise barren fluids, as well as those in which unaltered urine ferments under the influence of the high generating temperature of 122° F. (50° C.), all alike point to the same conclusion. They show, as other experiments have done, that an exclusive germ-theory of fermentation is untenable; and they show further that living matter may and does originate independently during the progress of fermentation in previously germless fluids. As a result of the fermentative changes taking place in boiled urine or other complex organic solutions, many new chemical compounds are produced. Gases are given off, or these, with other soluble products, mix imperceptibly with the changing and quickening mother-liquid, in all parts of which certain insoluble products also make their appearance. Such insoluble products reveal themselves to us as specks of protoplasm, that is, of 'living' matter. They gradually emerge into the region of the visible, and speedily assume the well-known forms of one or other variety of *Bacteria*. These insoluble particles would thus in their own persons serve to bridge the narrow gulf between certain kinds of 'living' and of 'dead' matter, and thereby afford a long sought-for illustration of the transition from chemical to so-called 'vital' combinations."

ZOOLOGY.

The British Association Meeting at Glasgow.—The meeting at Glasgow, commencing on the 6th of September, is expected to be a very good one. The guarantee fund is the largest yet subscribed, amounting to nearly £7,000. The "Challenger" naturalists will be present, and undoubtedly many of their discoveries will be discussed, as Sir Wyville Thomson is to deliver one of the two usual "Discourses" to the members. Lieut. Cameron will, no doubt, be the "lion" of the popular Geographical Section. The following places have been secured for the use of the Association:—The University, where, as at present arranged, all the sections, except the Geographical and Ethnological Section (Section E), will meet, Section E meeting in the large upper hall of the Queen's Rooms. At the University also will be the reception and refreshment rooms. Kelvin-grove Museum.—This will be the receptacle for the exhibitions of machinery, of chemicals, and textile fabrics. Queen's Rooms.—Here will be held an exhibition of the zoological and botanical collections of the district, and here also the meetings of Section E will take place. The upper Corporation Galleries will be filled with a geological exhibition, there being no room in the museum at the University to accommodate more than the Archæological Section, in addition to the permanent and temporary exhibits already arranged there. The City Hall and the Botanic Garden Palace have also been secured for the use of the Association. The Chambers of the Association, where all inquiries may be made, will be found at 135, Buchanan-street. A great many of the citizens have indicated their wish to receive guests, and a list is being drawn up of expected visitors, from which guests may be selected. It has been arranged that excursions will take place on Saturday, the 9th, and Thursday, the 14th of September, to the following, among other places:—Arran, Lochlomond, Loch Fyne, and the Holy Loch, Coatbridge, and Paisley. Mr. A. B. Stewart has placed his yacht at the disposal of the Association, as has also Mr. Duncan, of Benmore, for dredging expeditions. It is intended that there will be at least one dredging excursion to the Firth of Clyde, or other suitable place. Mr. Duncan will also receive at Benmore a party of 100, who go the round by Loch Fyne, for whom he has arranged a delightful excursion. Mr. Martin, of Auchendennan, will receive a party at dinner there, and Mr. Campbell, of Tulliechewan, and Mr. Matheson, of Cordale, have also intimated their desire to show hospitality to members of the Association visiting Dumbartonshire. Mr. Ellis will entertain a party at luncheon at Coatbridge after inspection of the North British Wireworks, and Sir Peter and Mr. Thomas Coates are expected to do the same at Paisley.

The "Challenger" Spoils.—According to *Nature*, Prof. Wyville Thomson had not set foot long in England before presenting in person a preliminary quota of his results to the learned bodies. Two papers read by him at the Linnean Society on June 1, embodied observations on Echinodermata, a group to which, as is well known, he previously had paid much attention. One of the communications described some new living Crinoids belonging to the Apiocrinidæ. Of deep-sea forms the stalked crinoids are extremely rare, and have a special interest on account of their palæontological relations; it was therefore with satisfaction that near St. Paul's Rocks, at 1,850 fathoms, the trawl brought up, among other things, an entire specimen of a new crinoid, *Bathycrinus Aldrichianus*, and fragments of another, *Hyocrinus bethellianus*. At other stations and on different occasions, were obtained another species of *Bathycrinus* (*B. gracilis*) and an undetermined beautiful little species of *Hyocrinus*, besides examples of the *Rhizocrinus lofotensis* of Sars; all of these being referable to the Apiocrinidæ. In pointing out their structural peculiarities and alluding to *Bathycrinus*, he mentioned that the stem barely enlarges at its junction with the cup, the ring formed by the basals is very small, and the first radials are free from the basals and often free from one another, while the oral plates

are absent. This genus appears to possess an assemblage of characters in some respects intermediate between *Rhizocrinus* and the pentacrinoid stage of *Antedon. Hyocrinus bethellianus* has much the appearance, and in some prominent particulars it seems to have very much the structure of the palæozoic genus *Platycrinus* or its sub-genus *Dichocrinus.* The stem is much more rigid than that of *Bathycrinus;* the cup consists of two tiers of plates only; the lower is to be regarded as a ring of basals, and the upper consists of fine spade-shaped radials. There are five arms, which are pinnulated. The proximal pinnules are very long, running on nearly to the end of the arm, and the succeeding pinnules are gradually shorter, all of them, however, running out to the end of the arm. Distally the ends of the five arms, and the ends of all the pinnules meet nearly on a level. This arrangement is unknown in recent crinoids, although we have something close to it in species of the fossil genera *Poteriocrinus* and *Cyathocrinus;* with this, however, their resemblances end. *Rhizocrinus* finds its ally in the cretaceous genus *Bourgueticrinus; Bathycrinus* and *Hyocrinus* are evidently related to the former, but the characters of the Apiocrinidæ are nevertheless obscure in the two latter. In his second paper Prof. Wyville Thomson drew attention to peculiarities in the mode of propagation of certain Echinoderms of the Southern Sea. He passed in review examples of the Sea-cucumbers (*Holothuroids*), Sea Urchins (the circular *Cidaroids*, and heart-shaped *Spatangoids*), Star-fish (*Asteroids*), and the Brittle Stars (*Ophiuroids*). In allusion to their phases of development, he stated the majority of these pass from the egg without the intervention of a locomotive pseudembryo. Among other data in support of this view he said, that while in warm and temperate seas "plutei" and "bipinnari" were constantly taken in the surface-net; yet during the southern cruise between the Cape of Good Hope and Australia, only one form of Echinoderm pseudembryo occurred, and which was considered with some little doubt as the larva of *Chirodota* from the presence of dermal, calcareous, wheel-shaped spicules. Furthermore Prof. Wyville Thomson described in detail, among the majority of the foregoing groups, the almost constant occurrence of a curious receptacular pouch wherein the young are carried until arriving at a certain maturity. This marsupium is situated on the dorsal portion of the body, and is composed of a series of plates which meet centrally and permit of the young creeping about and returning to it for shelter. The young derive no nutriment from the parent while contained in the "nursery," other than it may be a mucous secretion.

The "Challenger" Expedition.—Our readers will be pleased to see another proof of the attention which Science is forcing for itself in high places, in the fact that Prof. Wyville Thomson, chief of the scientific staff of the *Challenger* expedition, has just been knighted by Her Majesty, and is now, therefore, Sir Charles Wyville Thomson. The honour thus worthily conferred will be appreciated as a graceful tribute to modern science.

Dredging off Teignmouth.—In the spring of the year, dredging over the oyster-bed about a mile and a half off Teignmouth, we hauled in a large *Venus islandica*, with four *Pleurobranchus membranaceus*, one of them a very large one. The shell was beautifully clean, and looked as if the mollusk had recently been taken out of it. Can any one of the readers of Science-Gossip inform me what food the latter mollusk consumes?—*A. J. R. Sclater, Teignmouth.*

The late Mr. Edward Newman, F.L.S.—All naturalists will be sorry to hear of the death of this hard-working naturalist. He has done more than many men of higher-sounding honours to bring fresh workers into the fields of entomological and botanical science, and the influence of his labours will be felt for many years to come. As editor of the *Zoologist*, he continued to the last to labour among the subjects he loved so well. He will be missed by many to whom he was always ready to give advice based on a life-long experience; and scientific literature has lost a useful and vigorous pen in its cause.

"Popular Science Review."—The quarterly number for July of this useful periodical is one of the best we have ever seen. Prof. Mivart's article on "What are Bats?" is alone worth the price of the number, as giving a clear outline of the structure and relations of the least-known of the mammalia. Mr. W. A. Lloyd has also a capital article on "Aquaria: their Present, Past, and Future"; and Prof. Flower's paper on "The Extinct Animals of North America" will be read with keen zest by all naturalists and geologists interested in the "Missing Links" which the geological record is every day giving up.

Provincial Natural History Societies.—Chief among the many "Reports" and "Proceedings" published by local naturalists are those of the Norfolk and Norwich Naturalists' Society. Among several of the objects which this well-known club has for its object, is one we should like to see carried out by all similar associations throughout the country—"the discouragement of the practice of destroying the rarer species of birds that occasionally visit the country, and of exterminating rare plants in their native localities." Besides the address by the president (Mr. J. B. Bridgman), this number is valuable to all English naturalists

for containing the extracts of the Journal of Robert Marsham, giving an account of the severe winter of 1739-40; and also the correspondence of that naturalist with Gilbert White (not before published). The latter paper makes above 60 pages. The Proceedings of the Liverpool Naturalists' Field Club show us that this society continues the very doubtful plan of offering prizes for plants, &c. The address of the president (Rev. H. Higgins) is exceedingly valuable, being devoted to the etymology of plant-names. The present number also gives an account of the excursions of the year. The Chichester and West Sussex Natural History and Microscopical Society's report shows us that in the South amateur naturalists are doing good work. The Lewes and East Sussex have also just issued their twelfth annual report, containing extracts of some valuable papers.

BOTANY.

Pittosporum Tobira.—Many years back I was struck with the beauty of the *Pittosporum Tobira*, an evergreen abundant at Jersey. I have since urged nurserymen at Brighton to introduce it there; but there was a strong impression that the climate was too severe. In Paxton's "Botanical Dictionary" it is said, "*P. Tobira* will succeed against a south wall, with the protection of a mat in severe weather; and in the Heatherside "Nursery Manual" it is spoken of as "not hardy, and the more the pity, as the flowers are very fragrant." I have, therefore, been not a little surprised to find it growing freely and flourishing at Folkestone, where the shrubs are from twelve to twenty years old, six feet and more in height, and as many in breadth, exposed to the very severe easterly and south-easterly winds in front of the sea, on the highest part of the west cliff, as well as in other parts of the borough (in one place it is more than ten feet high, and wide in proportion), and never against a wall. It is now (June) in full flower; the leaves are verticitate, shining, thick, and tough, with umbels of very abundant white flowers, which have a powerfully fragrant odour of the orange-flower and jasmine. If it succeeds so well at Folkestone, where it is so exposed, and without protection, why should it not do so at Brighton and elsewhere? I find another very pretty evergreen flowering-shrub abundant at Folkestone in shrubberies and gardens in the most exposed spots, viz. *Lonicera Ledebourii*, which a Folkestone nurseryman tells me is as hardy as the common laurel. It bears very pretty orange and red flowers, with large crimson bracts, is four feet high, and altogether a desirable addition to the shrubbery. I do not remember to have seen it at Brighton, where it certainly should be cultivated in the Pavilion and other gardens. The same may be said of the *P. Tobira*. The bay-trees at Folkestone have all had their leaves destroyed during the late severe winter, but the two evergreens above mentioned have not suffered in the slightest degree.—*T. B. W., Folkestone.*

Decay of the Trees in Hyde Park.—In Science-Gossip for May, 1873, is a memoir on raphides and other plant-crystals by Professor Gulliver, F.R.S., illustrated by numerous woodcuts; and he has subsequently given descriptions, with a plate, of the short-crystal prisms in various plants, more especially of the order Leguminosæ, in the *Monthly Microscopical Journal*, Dec., 1873. As to the use of raphides and other plant-crystals, he regards them as valuable manure, to be restored at the fall of the leaf to the earth for the nutriment of the parent plant; and besides to afford at other times important botanical characters, in which respect true raphides are very significant. The report of the June meeting, 1876, of the East Kent Natural History Society contains some applications of these facts to the sad state of the trees in Hyde Park, so much deplored of late in the newspapers and elsewhere. As if to remove the natural food of these trees, their fallen leaves and fruit have for many years been carefully swept away, and no suitable manure substituted. These leaves and fruit are very rich in sphæraphides and short prismatic crystals, consisting chiefly of phosphate or oxalate of lime, the very food required for the preservation of the plant. And indeed every gardener well knows the excellence of leaf-mould as manure; but in no work on botany or horticulture or arboriculture has the main cause of that excellence been explained or even recognized. But now we see how the fall of the leaf is a provision of nature for the welfare of the plant. In such a soil as that of Hyde Park the calcareous salts are especially needed for the preservation of the trees. No wonder, then, when so long and regularly deprived of the fallen leaves and other parts, these trees should show signs of decay, just as beasts would pine and waste away if their natural food were taken from them. Had the old forests been always cleared of the fallen leaves, there would long since have been a decay of that noble vegetation which still excites the admiration of the traveller. Rich and deep soils may afford for long periods a sufficiency of calcareous salts for the preservation of the plants, but not so shallow and poor soils. The quantity of saline matter annually taken up even by a single tree from the soil, and appearing as microscopic crystals in the plant, is prodigious; and unless this saline material be returned to the earth, exhaustion thereof must sooner or later occur. The Legumens, too, are very rich in short prismatic crystals, and these no doubt in such plants as the

trefoils, which are so greedily devoured by cattle, afford an important supply of the calcareous or other salts which are essential in the animal economy. Has any agricultural chemist ever estimated the quantity, by weight, of the short prismatic crystals in a truss of clover? They present in the clovers and other trefoils lovely microscopic objects, suggestive, too, of utility. Nor are such observations alone in proving the high value of the microscope in explaining or directing practical operations in the cultivation of useful plants.

FLORAL ÆSTIVATIONS.—At the meeting of the Linnean Society, held on June 1st, the Rev. G. Henslow read a paper on floral æstivations, in which, after giving the eight kinds, viz., distichous, tristichous, pentastichous, half-imbricate, imbricate proper, convolute, valvate, and open, he explained their origin, and specially dwelt upon the new term "half-imbricate," which he applied to a very large number of cases ranging from perfect regularity to extremely irregular and zygomorphic flowers of the pea and snap-dragon. The author then showed how that, as well as the fifth and sixth kinds were successively deducible from the third or pentastichous (quincuncial) by merely shifting one edge of the *second* part *under* the adjacent edge of the *fourth* part. The author added a note on a new theory of the cruciferous flower, based on a quinary type, and which, by *symmetrical reduction* (*i.e.* the fifth part of each whorl would be suppressed) the remaining fours would, by further arrest, due to adaptations to insect agency, form the normal flower. He also disputed the tenability of *Chorisis* in the pairs of long stamens, regarding their occasional union as indicative of evolutionary advance and not retrogression; as cohesion is a subsequent stage to freedom, except in the rare cases of atavism indicated by solution and dialysis. The author called in question the justness of Pfeffer's view of the corolla of *Primula*, being an outgrowth of the andrœcium, by showing (*a*) the position of the stamens to be explained by the staminodia of *Samolus*, (*b*) that the corolla appearing subsequent to the stamens is no anomaly, (*c*) that the fibro-vascular bundles are ten in number, of which five are intermediate, and (*d*) that phyllotactical æstivation were those of true leaves; so that all these facts conspired to render the theory untenable.

GEOLOGY.

FOSSIL CARBONIFEROUS PLANTS. — Professor W. C. Williamson, of Owen's College, Manchester, has just contributed the eighth of his valuable memoirs on the above subject to the Royal Society. After describing in it a peculiar stem of a new species of fern, he proceeded fully to notice the stems and seeds of Gymnosperms. Of the former, various modifications of the *Sternbergian Dadoxylons* are described, and shown to correspond very nearly to many recent conifers, though with distinctive features of their own, especially in the structure of their woody fibres, and in the leaf-bundles of some species being given off in pairs. The author still excludes the Sigillariæ from the Gymnospermous group. The most important novelties are the Gymnospermous seeds, exhibiting their internal organization, found in France by M. Grand-Eury, and by the author in this country. Of these he describes a number of new genera and species in addition to the Trigonocarpons previously described by Mr. Binney and Dr. Hooker. The most remarkable of these is one designated *Lagenostoma ovoides*, in which a large flask-shaped cavity, inclosed within a crenulated canopy, occupies the apical end of the seed, between the apex of the endosperm and the exostome. Brongniart believed, with reason, that such cavities have originated in the absorption of the apex of the nucleus, leaving the corresponding part of the nucular membrane to form the cavity or "lagenostome." In this lagenostome large pollen-grains are found in many cases. Brongniart designates it the "cavité pollenique." Examples of several other seeds presenting generic and specific modifications of the same type, as well as several species of the well-known genus Cardiocarpum and of Trigonocarpum. In all these the primary nucleus seems to have been absorbed, being now only represented by the investing nucular membrane. Within this is an inner structureless bag, which, in some of the Cardiocarpa, is filled with parenchyma, and which appears to represent the *secondary* perispermic membrane, or what is really the endospermic membrane, or *primary* embryo-sac of the Gymnosperms. The intimate structure of Trigonocarpum agrees with Dr. Hooker's description of it so far as the longitudinal sections are concerned, save that here also a "cavité pollenique" exists. Transverse sections show that the well-known sandstone casts of Trigonocarpum do not represent the external form of these fruits, but are *casts of the interior* of the hard endotesta. This latter was not trigonous externally, like the common specimens, but had twelve longitudinal ridges, three of which, corresponding with those of the sandstone casts, were more prominent than the rest. The endotesta was invested by a delicate parenchymatous sarcotesta. All these seeds appear to have cycadean rather than coniferous affinities. One winged seed alone (*Polypterospermum*), from the uppermost coal-measures at Ardwick, resembles a true conifer. In conclusion, the author calls attention to the number of yet unknown stems and leaves of Phanerogams, which must have belonged to the numerous seeds now known to exist in the coal-measures of England, France, and North America.

TRACES OF AN AMERICAN AUTHOCHTHON.—A capital article on this subject appeared in the *American Naturalist* for June last, by an old subscriber of SCIENCE-GOSSIP, Dr. C. C. Abbott, of Trenton, New Jersey. Dr. Abbott writes pleasantly and earnestly of his hunts after the relics of the American stone ages, and particularly describes some he found in strata of river-drift, which he believes to be the forerunners of the later series. The ancient American people, he believes, were displaced by the race of new comers who fabricated the more modern relics, the former living as long ago as the close of the Glacial epoch, when the river in whose strata their remains are found flowed at an elevation of at least fifty feet higher than it does now. It is singular to find that even the savage Red Indians are related to a stone-implement people just as we are.

A BONE-BED IN THE LOWER COAL-MEASURES.—Mr. J. W. Davis, F.L.S., has just laid before the Geological Society of London an important discovery of the remains of a large number of carboniferous fishes. They occur in a thin bed, which is composed almost entirely of the remains of fishes, and rests immediately upon the "Better-bed Coal" of the Lower Coal-measures in Yorkshire. The bed varies from a quarter to five-eighths of an inch in thickness, and is overlaid by a thick bed of blue argillaceous shale, containing remains of plants. The author described the order of the deposits both above and below the "Bone-bed," and gave a list of the organisms of which remains are found in the latter, including species of *Gyracanthus*, *Ctenacanthus*, *Lepracanthus*, *Acanthodes*, *Pleuracanthus*, *Orthacanthus*, *Diplodus*, *Pleurodus*, *Helodus*, *Cladodus*, *Pœcilodus*, *Petalodus*, *Harpacodus*, *Ctenoptychius*, *Megalichthys*, *Holoptychius*, *Strepsodus*, *Acrolepis*, *Platysomus*, *Acanthodopsis*, *Amphicentrum*, *Rhizodopsis*, *Cycloptychius*, *Gyrolepis*, *Palæoniscus*, *Cœlacanthus*, and *Ctenodus*. The author also described spines which he regarded as indicating two new genera of Elasmobranchs, one probably allied to *Pleuracanthus*, and the other (*Hoplonchus*) allied to *Onchus* and *Homacanthus*. Bones belonging to the Labyrinthodont genus *Loxomma* are met with, rarely, in the deposit.

NOTES AND QUERIES.

WOODLICE.—I should be obliged if any of the readers of SCIENCE-GOSSIP would inform me of the best means of getting rid of woodlice. Our garden is swarming with them.—*Querist.*

CROCUS.—In early spring I had a basket of crocuses sent me in flower. Some were a deep purple, some paler, but none yellow. I planted them in pots, and placed them in my office, under a skylight, where the sun does not shine at all. The first flowers kept fresh for more than a fortnight, and fresh ones sprang up beside them; but the fresh ones were all yellow! Even before the first flowers had drooped, the yellow ones sprang from the same root. I attribute the change to the absence of sunshine. It would appear that yellow is the original colour.—*A. E., Worcester.*

HOW TO TEST FUNGI.—The following extract is from the "People's Friend":—"The following is said to be an infallible test for knowing the qualities of mushrooms: Before peeling the mushrooms, pass a gold ring backwards and forwards over the skin. Should the bruise thus caused turn yellow or orange-colour, it is poisonous; but otherwise it is quite safe. Every married woman has a gold ring to test the mushroom thus; or a sovereign rubbed on it will have the desired effect." Would some of our experienced fungiologists say if there be any truth in the above test, and, if so, whether any other metal will answer as well as gold? If an accurate test, it cannot be too widely known; and if erroneous, the sooner it is confuted the better.—*J. P. Soulter.*

GROWTH OF THE WILLOW, &c.—At the conclusion of his paper "On the Growth of the Willow," in SCIENCE-GOSSIP for May, Mr. Edwin Lees refers to the fact of elms being occasionally resuscitated in the peculiar way that he had already mentioned in the case of willows. Some of your readers may be glad to be introduced to a good example of this within easy reach of many of them. In St. James's Park, about sixty yards or so to the S.E. of the Suspension Bridge, and close to the pathway, stand the wrecks of two fine elms, broken down some twelve feet from the ground. Near the top of one of these trunks a branch has thrown down roots along the old stem to the ground precisely in the manner mentioned by Mr. Lees. I have often pointed this out to friends, in walking from the St. James's Park Station of the District Railway.—*G. J. P.*

BROWN TOAD.—With regard to the colour of toad or frog, all depends on the weather. In Herefordshire, some forty years ago, they were called the "Poor Man's Weather-glass." I have myself, when a child, often heard it said, on seeing a yellow frog hop across the path, "We shall have fine weather," or some such remark; or, on seeing a dark-coloured one, "There will be rain." I have seen some toads nearly black in a very wet season, as also a bright yellow in a dry and warm summer day. In my garden, fifteen years ago, a toad appeared to make its home in a hole under the root of a large pear-tree, and was not at all timid, but used to sit at its door while my children were playing on the lawn close by. I have often noticed this one changed colour, but whether before or after a change in the weather I never observed, and have now no garden, and no opportunity of watching these interesting creatures.—*A. E., Worcester.*

TOADS.—J. H. B. Brooke will find that these reptiles, like our newts and frogs, are much darker just before, and much lighter directly after, changing their skins than at any other time. At least, I have found this to be the case with all those I have ever kept.—*B. B. Woodward.*

THE CUCKOO.—In Mr. Taylor's interesting volume, "Half-hours in the Green Lanes," he makes a statement respecting the Cuckoo which my experience does not confirm. It is this: "We know it builds no nest of its own, but drops its eggs in that of other birds, nature appearing to have

endowed every hen cuckoo with the power of laying eggs similar in colour to those of the species n whose nest she lays, in order that they may not be detected by the foster-parents." This is the first time I ever saw it stated that the cuckoo (or any other bird) possessed a power by which it could regulate the colour of its eggs; and all the cases I have had under my notice certainly do not bear it out. In the first place, I do not give the birds upon whom the deception is practised credit for such perception as this power would imply they must have to make it needful. In the second place, all the eggs which I have seen have been of the same colour, with very little variation. And again, they are of such a colour as would seem least striking against any of those which they have been found in contact with. And, thirdly, the Cuckoo generally, after laying her egg, turns out those previously in the nest, which I cannot harmonize with the marvellous power which Mr. Taylor credits it with. For I should certainly think it runs much greater risk of detection by leaving only a single egg in place of the three or four, than by laying an additional egg, the colour of which might differ a little from those of the rightful occupant of the nest. One peculiarity of the Cuckoo's egg is its smallness, it being only about one-fourth the size one would expect from the size of the bird. This, Mr. Selby suggests, may be accounted for by the fact that if it were larger it would require to be laid in a larger nest, the occupants of which might be able successfully to resist the encroachment. But in this case the Cuckoo need possess no special faculties to account satisfactorily for the circumstance. Among the birds whose nests it generally usurps are the following:—The hedge-sparrow, the robin, the titlark, the wagtail, the redstart, the whitethroat, the willow-warbler, the rock-lark, the skylark, the reed-warbler, the reed-bunting, the sedge-warbler, the willow-wren, the yellow-bunting, the blackbird, the wren, the thrush, the whinchat, the greenfinch, the grasshopper-warbler, the chaffinch, and the red-backed shrike. The eggs of many of the birds here mentioned vary much more than those of the Cuckoo in my experience, and if I give these birds credit for such perception of colour as would make this special gift of the Cuckoo necessary, I should imagine them sometimes getting into greater trouble in the recognition of their own eggs when they vary, as they do in the case of the robins, from a dark shade to pure white, than they would with those of the Cuckoo. My conclusion is, therefore, that the colour of the eggs does not vary, and certainly cannot be varied at the will of the bird; and that the only peculiarity noticeable in the Cuckoo beyond its parasitic habit, is that it should lay in the nests of birds much smaller than itself, and that its eggs should be only one-fourth their proportionate size, apparently to suit the size of the eggs of those nests. If any of your readers can confirm Mr. Taylor's opinion, I should be glad of their experience, and hold myself open to any correction capable of proof; but if his statement is erroneous, as I hold it to be, then I think it should not be allowed to remain, to convey a wrong impression in a book otherwise calculated to be so instructive to all students of science.—*J. L. Copeman.*

The Cuckoo's Eggs.—All, or almost all, the mistakes about the Cuckoo hatching her own eggs and rearing her own young have arisen from confounding the nest of other birds for that of the Cuckoo. The latter never lays more than one egg in the same nest, and that is always in the nest of another bird: it *never* makes a nest. The young of the Nightjar have often been mistaken for the young of the Cuckoo, the latter being very unlike the full-grown bird. In "The Architecture of Birds" (Library of Entertaining Knowledge), there is much upon this point. To it I beg to refer your correspondent J. G. Henderson.—*J. S. Wesley.*

Water-rat.—The Water-rat, or more correctly Water-vole, for it is not of the same genus as the common brown rat, is entirely a vegetable-feeder. Professor Bell's words (see his book) are—"Food, which we have every reason to believe consists exclusively of vegetable substances."—*J. S. Wesley.*

Boat-flies.—I have kept many specimens of *Notonecta*, and have always found that the sound noticed by Tom Workman was produced by the determined attempts of some one individual to propel himself through the glass sides of the aquarium. If the latter happens to be a bell-glass, or glass jar, it can be heard several feet off. As T. W. mentions having several in his aquarium, it is possible that his attention has been fixed on the wrong individual.—*B. B. Woodward.*

Management of Silkworms.— In Science-Gossip for May, "Inquirer" begs for information on the treatment of silkworms. In our climate it is generally better to retard their development by keeping the eggs in a cool dry place, because if the hatching is hastened, their natural food, the mulberry, is not in leaf. They can be fed upon lettuce, cherry, or black-currant leaves if necessary, but the former fade quickly, and therefore become unwholesome. It is important to remove all dead and decaying matter as quickly as possible, cleanliness being of the greatest consequence. It is said the "worm mother" abroad puts on clean clothes every time she enters the room. The worms may be kept in paper trays, and supplied with fresh leaves at least twice a day,—the oftener the better. Gently remove them from the old remains, and put them on the fresh. The difficult operation of changing the skin is performed four times, when they require special care, and sometimes a little assistance, to get rid of the old skin, or they sometimes die in the struggle. When they begin to spin, put them in conical paper cases, pinned against the wall or some support. The silk may be wound off by a little hand-machine, the cocoon being put in a little warm gum-and-water to prevent the thread breaking: winding should be done before the moth eats through the cocoon, but not until the chrysalis is fully matured, which will usually be in two or three weeks' time, and may be ascertained by gently shaking the cocoon, and hearing it rattle inside. It is better to put the chrysalis in bran, and then leave the moths in open boxes to deposit their eggs for next year. When fresh mulberry-leaves cannot be gathered daily, they can be kept laid singly in layers, folded in a damp cloth, and put in a damp cellar or cool place. The deeply indented mulberry-leaves are best; many other serrated leaves are also considered wholesome. Sericulture is of growing importance, not only because some consider it might afford a suitable and remunerative occupation for ladies, even in England, but especially since the mysterious development of the silkworm disease on the Continent has tended to check the supply of a useful article, and ruin the many poor people whose occupation it is to cultivate it. Good silk always commands a good price. Mrs. Bladen Neill, a lady from Melbourne, Australia, showed some very fine cocoons from that place, where she has been the means of establishing a

company of women for silk-culture, which answers well so far. She read an enthusiastic paper on the subject at the British Association in Bristol. 1875, and showed that by carrying the egg, or "seed" (as they are technically termed) from one continent to the other, and giving them two winters in one year, —one in the hills of Australia and the other in Switzerland,—she could stamp out the disease that had baffled the growers and men of science. A pure and healthy race of worms were thus produced; and she said that Australian seed, from a new and good stock must be of value in Europe to supersede the degenerated, impoverished, and almost useless race, and that it must be worth while to cultivate them in England for this purpose alone, independently of the silken garments that might be spun and woven by the ladies themselves. She also begs that old mulberry-trees may be carefully preserved to supply slips for new, and considers that the cultivation of young mulberries would be a good investment for shipment elsewhere, especially to our colonies; and lastly, that ladies might profitably and usefully supply good seed when wanted, spin their own silk into strong and useful fabrics, of various degrees of goodness and beauty, and thus supply a means of self-support to a class who increasingly want it. Mrs. Neill's London address was 27, Prince's-gardens, S.W., whence further information might possibly be had; or, if required, the Australian seed might be procured from her other address.—*G. S.*

THE SNOWDROP.—I doubt whether many botanists consider the Snowdrop as indigenous. It is never seen except where there is strong reason for suspecting it to have been planted, or else an outcast from cultivation. It is hardly likely that Ray would have omitted it if it were then, to use Mr. Wilkinson's words, "in such abundance and in so many places as almost to leave no room for doubt." Bentham says, "Probably not indigenous."—*J. S. Wesley.*

PARASITIC VORTICELLÆ ON CYCLOPS. — In Slack's "Marvels of Pond Life" is a notice of *Epistylis digitalis* occurring as a parasite on Cyclops. I have myself found them adhering to Cyclops, and less often to Daphnia. Last April I captured two of the former in water from Hampstead Heath, which were more than usually clothed with Epistylis; so much so in fact, as to present a "fluffy" appearance to the naked eye. Several examinations were made at intervals of a few days. Every part, except the antennæ was thickly covered with the parasite, and though, when the animal struggled, the lively little bells collapsed suddenly, yet the instant the commotion ceased, their stalks again extended, and the bells recommenced the formation of their innumerable whirlpools with intense energy. The last time I examined one of these creatures, a few dozens only of the bells remained, but the host was still covered with such a mat of the stems as to completely obscure its outline, though it did not appear to be inconvenienced by their presence.—*Micros.*

WOOLLEN MOTHS.—Will any of your subscribers kindly inform me through the medium of SCIENCE-GOSSIP, the most sure and successful way of destroying that destructive little moth which infests woollen substances?—*William Bean.*

TO KEEP AWAY FLIES.—A pot of musk will always keep a room free from flies. A lady tells me that friends of hers living in the country have tried this, and find it answer: they keep musk in dairy, larder, and kitchen, with great success.—*Helen E. Watney.*

FLIES IN ROOMS.—Some time ago a correspondent of the *Field* asserted that geraniums or calceolarias in a window-sill kept flies out of a room. Perhaps this might be worth trying, if feasible, by the lady who complains of flies in her stable. The existing flies should be first smoked out. The result, if successful, would be interesting to publish in your paper.—*H. B. Lindsay.*

FLIES IN STABLE.—I only give my own plan for preventing flies in summer-time teasing man or horse out of doors. I take, when flies are very troublesome, a handful of elder-leaves and just bruise them in the hand and rub my face and hat. And so when riding I used to rub them over the pony's head and body. If this be properly done, the flies will *not settle*, neither will they come much in the neighbourhood of an elder-tree: and I think if the dung were removed to a farther distance from the stable and an elder-tree planted close to the window and the leaves applied as above, great benefit would be found.—*E. T. Scott.*

WISTERIAS AND CLOTHES MOTHS.—When staying with some friends lately who live on Clapham Common, they informed me that they had applied to their landlord for leave to cut down a large "Wisteria" that grows over the front of their residence. Seeing, I suppose, by my face that I thought it a pity to do so, they gave as their reason for doing it that the tree "harboured clothes-moths" to a serious extent, which, of course, forced their way into the house, and whose damages had already put them to considerable expense. The experience of friends of theirs was similar, and their own gardener assured them he had remarked numbers of the moths harbouring behind the leaves and on the stems close to the brickwork. It occurred to me then that when we ourselves were living at Barnes three years ago we were much troubled with the clothes-moth, and that a "Wisteria" also climbed up the front of our house there. This connection between the tree and the insect being new to me, and a fact worth knowing, I therefore put you in possession of it, to act as a warning to those of your readers who may intend to plant "Wisterias" against their houses.—*Windsor Hambrough.*

BIRD PETS.—Having for some months kept different pets, ten months ago I purchased a pair of Java sparrows, or "Orange-cheeks." In the beginning of this winter the hen died, as I supposed from cold. At first, I feared the cock would die of grief, but to my surprise he seemed happier and more contented than before; three or four months after, I noticed the bird became dull and mopy, and in a few days the perches were marked with blood. On closer examination, I observed the bird had eaten off one claw, and before night, all were gone, except one. The bird appeared well in itself, but continued to peck at its foot. Not being able to get any information, even from bird-fanciers, I write to you, hoping that you will have my letter inserted in the Magazine as soon as possible, so that I may receive advice from those who know more about birds than I do, as I am anxious to save his life.—*Sibbie Horne.*

REVIVAL OF AN OLD STORY.—Can any of the readers of SCIENCE-GOSSIP throw any light upon the following passage, which is taken from Dr.

Schliemann's interesting work on "Troy and its Remains," published last year? "Among the huge blocks of stone at a depth of from 12 to 16 mètres, I found two toads; and, at a depth of 39½ feet, a small but very poisonous snake, with a scutiform head. The snake may have found its way down from above, but this is an impossibility in the case of the large toads, *they* must have spent 3,000 years in these depths. It is very interesting to find in the ruins of Troy living creatures from the times of Hector and Andromache, even though these creatures are but toads." I have often before seen somewhat similar statements, vouched for as facts by some, and as confidently declared impossible by others: if true, how do these toads manage to get inclosed *alive* in such places? I presume they are not bricked up in them for misconduct by their brother-toads, as used to be done to poor nuns who broke their vows (see "Marmion"). And how do they live on, even if torpid, for so long *without air*, breathing not oxygen, but carbonic acid? I confess I am much puzzled, and would thankfully be enlightened in some way.—*G. N. W.*

Natural History Notes.—My friend, W. Collier James, of Plymouth, was fishing in a Dartmoor stream recently, when he observed a snake (*Natrix torquatus*), having the corolla of a primrose round its neck, which the flower still encircled, when entering its hole. Accident rather than selection must have given the reptile this floral necklace, which fairly entitles it to the epithet of *torquatus*. I have sometimes urged my observant friend, or his brothers, to record some of their piscatory experiences in the pages of Science-Gossip. One day he saw the head of an eel with widely-opened jaws, whilst a stone concealed its body. Some little fishes were swimming in the small pool before it. One fish after another entered the fatal portal, and were found in the stomach of the eel, which he caught. A well-known otter has often interfered with their fishing for salmon. Lying concealed near a little fall in the river, and listening to hear the splash made by the fish on leaping, he seemed almost instantly on the spot to seize his prey, sometimes of many pounds in weight. A young relative of mine (H. Tregelles), residing at Santiago, and recently travelling in a railway train in that vicinity, whilst passing a flock of seven ostriches (*Rhea americana*) shot one which weighed about 40 lb.—*C. Fox, Trebah.*

Pulmonaria officinalis. — The other day, whilst walking along one of the lanes which are still left to us for botanical research, I picked a specimen of the common Lungwort (*Pulmonaria officinalis*) in full bloom, the peculiarity of which consisted in it being, if I may so call it, variegated. There were in the same cluster white, pink, and violet-blue flowers; some of these blue flowers were spotted with white and pink alternately. All your readers are no doubt aware that the buds are of a pink colour; but I should much like to know if this special form is what seems to me a freak of nature, occasioned by insects, &c., which we are sure influence the varieties of plants, and so cause many curious changes. I was sorry that I did not get the root and put it in my garden, but suppose my hasty enthusiasm is to blame.—*Thos. Palmer.*

Local Names of Plants.—Although a Cumbrian, I never heard the *Polygonum Bistorta* called "Easter Magianty"; but more than half a century ago I invariably heard old people in the district where I resided speak of it as "Easter man-giant" (Easter-eating, French *mangeant*); consequently we may suppose that this has been the popular name of that plant for at least a century or a century and a half, and how long previously it is perhaps difficult to say. Now the French word *mangeant* sounds very like *man-giant*, and the common people would very naturally substitute the latter name for the former. With respect to the word "yorlin," I have no idea of its origin, but it was not always confined to the earth-nut, as I recollect very well when a youth of hearing it often applied to the Yellow-hammer as Yellow-yorlin. This bird, at that period, was always known to us boys by the name either of the "yellow" or the "yellow-yorlin." On a recent inquiry I found that it was also known by the latter name in Northumberland.—*Dipton Burn.*

In answer to Alfred Bridon's question (in March number of Gossip) about the occurrence of the Hawfinch (*Coccothraustes vulgaris*) as far west as Somersetshire, would you allow me to put it to him whether he is not doing his best, by the taking of the nest and eggs, to render a rare occurrence still more rare? I see he uses the word *find*, and it may be that he has *observed* the nest without destroying it; but I must add one more to the many protests that you have printed against the destruction of rare birds, rare insects, rare plants, by the zeal of collectors.—*J. G. Halliday, Colonel, Devon.*

Volvox Globator.—Will you kindly ask this question in Science-Gossip? Is it usual to find the *Volvox Globator* only during about a fortnight in June, and then for it quite to disappear? I have found it the case for the last few years here. In the ponds only the water was thick with them; and most beautiful specimens; they lasted about a fortnight, and after that not one could be found. I have heard that the rotifera are very fond of eating them, but I do not think this quite accounts for it. I have found portions of them often, but never in perfection, except at this time. I also want to know if caddis worms, kept in an aquarium only for microscopic purposes, are injurious to the rotifera and other small fry, in the way of feeding on them.

The Large Tiger Moth (*Arctia caja*).—The following information may be useful and interesting to some of our young collectors. Last August I took a female moth of the large Tiger. I kept it in a box, where she laid a batch of eggs. The eggs remained a fortnight, when they became hatched. The larva continued feeding until the beginning of October, when they ceased feeding all the winter, until the middle of March, at which time they commenced again. They continued growing until the beginning of June, when they finished feeding for the last time. When these caterpillars have done feeding they spin a loose kind of silken hammock, and, after throwing off their larval skin, lie in the pupa state until July, when the beautiful moth appears, and continues through August and the early part of September, or even later.—*W. H. Narracott, Torquay.*

Vanessa Urticæ is the same as to markings in both sexes; at least, I never could learn or read of any distinction. Newman, in his elaborate descriptions, gives none. The insect is, as is well known, subject to much variation in colour and size. If Mr. Edwards wants to be certain as to the sexes of his specimens, he had better breed a lot (easily done), and he will then have no difficulty, I should think.—*J. S. Wesley.*

NOTICES TO CORRESPONDENTS.

G. C. Pearce.—The plant sent is a species of *Chara*, or "Brittle-worts," one of the Algæ.

Jas. Roper.—The flower-head is that of the Flowering Rush (*Butomus umbellatus*). It is abundant in the dykes in Suffolk and Norfolk.

R. C. N.—See the chapter on "Flowering Plants" in "Notes on Collecting and Preserving Natural History Objects," just published at 192, Piccadilly.

T. McGann.—We had received neither parcel nor "exchange," until the latter came in the note stating a parcel had been sent.

Mrs. G.—The "clubbing" of cabbage plants is due to the cohesion of the rootlets in growing. We should think that mixing the soil with a little gravel or coarse earth, which would admit air freely, might arrest the evil. Perhaps your soil is too fine, and impervious to water and air.

W.S.—The following books will be useful to you in easily identifying our common plants:—Mrs. Lankester's "Wild Flowers worth Notice"; Spencer Thompson's "Walks and Wild Flowers"; and better still, only more advanced, and therefore requiring a little more trouble, Dr. Hooker's "Students' Flora of the British Islands."

T. Roper.—The "brassy-looking" object is iron sulphite, or pyrites. It is abundant on the surface of the joints in some kinds of coal, as a thin film, similar to that in your specimen.

Miss B.—Your plants are:—No. 1. *Orchis morio* (Meadow Orchis); 2. *Geranium sanguineum* (Bloody Crane's-bill); 3. *Hippuris vulgaris* (Mare's-tail); 4. *Stellaria graminea*; 5. *Corydalis lutea*; 6. Evidently a portion of a species of *Galeobdolon*, perhaps *album*; but the plant is in too bad a state to correctly identify.

H. P. Durrant.—Your geological specimens are far from uncommon, being portions of the stems of encrinites, embedded in "chert," and having the outside calcareous matter naturally dissolved away, so as to leave the spaces between the joints filled in with cherty matter. In this condition they resemble the screwed end of an iron bolt: and, in Derbyshire (where they are very common in the carboniferous limestone), the people call them "Screw-stones."

H. T.—Your mosses, &c., have unfortunately been mislaid. Please send us others.

H. G. Dunn.—Your minute specimens in the clay ironstone are either the internal casts of a fossil species of *Rissoa*, or Foraminifera. We incline to think they are the former, but will see to them further.

C. W. Holgate.—Your specimen is *Vicia tetrasperma*.

E. Lamb.—Your specimens are:—1. *Orchis pyramidalis*; 2. *Lychnis githago*; 3. *Trifolium procumbens*; 4. *Lathyrus pratensis*.

R. Goffe.—See Mr. James Britten's articles in "Notes on Collecting and Preserving Natural History Objects," just published.

T. B. B. (Glasgow).—Our correspondent does not say the character of the soundings. Assuming them to be calcareous, the best plan is to give them a boil in a weak solution of caustic potash, wash well with distilled water, and mount in Canada balsam. Supposing them to contain silicious organism, the calcareous matter must be got rid of by means of hydrochloric acid, and then boiled in nitric acid. Mount in Canada balsam or dammar.—F. K.

R. Kidston (Stirling).—Labarraque's solution is the Liquor Sodæ Chlorinata of the British Pharmacopœia. It may be purchased of any respectable chemist under the latter name. Its price is trifling.

EXCHANGES.

Shells.—Pair of Pelican's-foot Shells (*Aporrhäis pes-pelicani*), for neatly-mounted Slides of Marine Objects.—C. P. Ogilvie, Sizewell House, Leiston, Suffolk.

Four Lizards, about 2 in. long, in exchange for Lepidoptera or offers.—G. Pearson.

Two Slides will be given for one Geological Section (*mounted*), or for one Geological Slide (*named*).—S., 63, High-street, Warrington.

Alopecurus bulbosus and *Carex divisa* offered. Wanted, 1,421, 1,422, 1,437, 1,445, 1,499, 1,505, 1,519, 1,521, 1,545, 1,554, 1,577.—Rev. F. H. Arnold, Fishbourne, Chichester.

A collection of Birds' Eggs, 75 species; 132 in collection and 72 duplicates, for Books.—H. G. Webb, Mentmore, Leighton Buzzard.

For exchange, a great variety of local Diatoms, for well-mounted Slides of interest.—W. J. Dickson, M.D., Falkland, Fifeshire.

Silene conica, *Hippophae rhamnoides*, offered for other rare Plants. Scotch Plants preferred.—H. W. J., Caius College, Cambridge.

Specimens wanted in exchange: *Fusus antiquus*, *F. Norvegicum*, *F. Islandicus*, *F. gracilis*, *F. propinquus*, *F. buccinatus*, *F. berniciensis*, *F. fenestratus*, and all the other varieties. Two good British Shells will be given, if in stock, for each one of the above.—A. J. R. Sclater, 9, Bank-street, Teignmouth.

Wanted, Specimens of *Morpho Menelaus*, *Plusia chrysitis*, and *Zygæna*, for well-mounted Slides.—M. Fowler, 20, Burnrow, Slamannan, near Falkirk.

Zannichellia brachystemon, Gay, in exchange for other Plants.—John Wm. Burton, 35, Hemans-street, Liverpool.

Will give 47 Parts of Morris's "Book of Birds" (1s. each), coloured plates, for a second-hand copy of Williamson or Carpenter on the Foraminifera—Recent, and Study of.—G. R. V., Hill Top, Attercliffe, near Sheffield.

British Mosses for Foreign Algæ.—M., 2, Dorset-gardens, Brighton.

Microscopic Slides, of highest class and diatomaceous, and other material, offered for a quarter-plate bellows Camera, with two double Plate-holders, with or without lens.—Capt. Perry, 42, Spellow-lane, Liverpool.

Microscopic Slides and Material also offered for Magic-Lantern Slides of good quality.—Capt. Perry, 42, Spellow-lane, Liverpool.

Carex elongata in exchange for *C. Davalliana*, *C. Buxbaumii*, *C. hordeiformis*, *C. incurva*, *C. phæostachys*, *C. punctata*, *C. tomentosa*, *C. ustulata*, or *C. leporina*, or send stamped and directed covering for specimen of same addressed to James Percival, 67, Fermoy-street, Higher Broughton, Manchester.

Some good foraminiferous Sand for well-mounted Slides.—C. P. Ogilvie, Sizewell House, Leiston, Suffolk.

To correspond with some Palæontologist, in each of the *Vertebrate*-bearing formations in Great Britain, who desires to exchange these fossils for those from the Cincinnati Group, Lower Silurian, U.S.A.—David W. De Beck, 65, West Fourth-street, Cincinnati, O., U.S.

Desiderata:—specimens of Lepidoptera from the North, as for example, *F. carbonaria*, *F. pinetaria*, *L. purpuraria*, *D. filigrammaria*, *L. cæsiata*, *L. ruficinctata*, &c.; Duplicate Lepidoptera, Birds' Eggs, and other objects of Natural History.—W. K. Mann, Granby House, Clifton, Bristol.

An interesting gathering of Marine Material for distribution, including Foraminifera from twenty-five places, Sertularians, Algæ in fruit, and with Diatoms *in situ*, Mollusca Palates, Sponge Spicula, Holothuria, &c., &c. Full particulars on receipt of stamped address.—T. McGann, Burrin, Oranmore, Ireland.

Lepidoptera.—Fine-bred specimens of *F. conspicuata*, for other local species.—H. Miller, jun., Ipswich.

BOOKS, &c., RECEIVED.

"Geological Stories." By J. E. Taylor. 3rd edition. London: Hardwicke & Bogue.

"Half Hours in the Green Lanes." By J. E. Taylor. 3rd edition. London: Hardwicke & Bogue.

"Half Hours at the Sea-side." By J. E. Taylor. 3rd edition. London: Hardwicke & Bogue.

"Annual Record of Scientific Industry for 1875." London: Trübner & Co.

"Blue and Sun-lights." By Gen. A. J. Pleasanton. London: Trübner & Co.

"Popular Science Review." July.

"Monthly Microscopical Journal." July.

"Land and Water." July.

"Les Mondes." July.

"Botanische Zeitung." July.

"American Naturalist." June.

"Canadian Entomologist." June.

"Boston Journal of Chemistry." June.

"Potter's American Monthly." June.

"Transactions Norfolk and Norwich Natural History Society."

"Transactions Bristol Natural History Society."

&c. &c. &c.

Communications up to 10th ult. Received from:—F. K.—G. H. K.—T. G. B.—G. H.—J. F.—G. G.—E. E.—J. R. S. C.—Dr. C. C. A.—Dr. G. B.—F. H A.—Dr. C. S. V.—D. W. D. B.—M. P. M.—J. C.—T. H.—M. A. T.—E. S.—J. L. M.—J. S. W.—H. P. M.—J. T. R.—W. S.—T. F.—G. W. L.—T. B. B.—G. C. P.—J. P.—H. P.—J. A. P.—G. H. K.—F. A. A.—H. M. J. U.—F. K.—S. U.—A. P.—J. W. B.—J. P.—H. E. W.—E. L.—J. E. E.—R. F.—E. E.—F. H. A.—Dr. E. F. N.—C. H. S.—C. W. H.—H. G. D.—G. R. V.—H. B. L.—W. L.—W. Z.—E. T. S.—T. B. W.—H. K.—M. F.—W. S.—C. P. O.—Dr. W. J. D.—H. G. W.—A. J. R. S.—Dr. G. S.W.—H. L. J.—W. B.—H. C.—J. S., jun.—G. P.—H. T.—R. R. T.—R. K.—E. M. P.—J. G.—R. L. J.—T. McG.—&c., &c.

THE GEOLOGY OF GLASGOW AND THE NEIGHBOURHOOD.

By R. L. JACK, F.G.S. (of the Geological Survey).

IN the present day "the neighbourhood of Glasgow" is a very flexible expression. For our purpose, however, it may be as well to restrict the meaning of the term to such localities as would by preference be visited from Glasgow rather than from Edinburgh, or Perth, or any other place where a stranger would be likely to settle.

In and around the city itself there is more to interest the geologist than would at first be expected. Hardly a day passes when the common device "Street under repair" does not meet the eye in some crowded thoroughfare. There is a fascination, which hardly the busiest can resist, impelling men to look into holes. But the average bystander departs gravely and sadly, as from a problem solved, after satisfying himself as to the object of the excavation. Beside such holes in Glasgow, however, the geologist sometimes lingers with a nobler curiosity, for every spadeful thrown up furnishes him with food for reflection. Occasionally a glaciated rock-surface is laid bare, or the outcrop of a coal-seam greets the eye. But it is generally on recent and post-tertiary geology that light is thrown by street-cuttings.

Within the last half-century some half a dozen canoes have been dug up within the limits of the city.* As it is a treat rarely accessible to see such relics of our savage predecessors *in situ*, one of the canoes may be visited in the Andersonian University. They prove (taken together with other finds) that men, using stone implements and fire to hollow out their boats from the truuks of trees, inhabited the shores of an estuary before the last slight elevation of the land converted the estuary into the site of a city.

Next in order of age are deposits representing different stages in the Glacial period. Striated rock-surfaces are abundant in the neighbourhood of Glasgow, and mark the passage of a *débris*-laden sheet of land ice from the highland mountains over the lowland plains and hill-tops. The striæ correspond in direction (except in cases of deflection caused by local obstacles) with the sources indicated by the proportions of the stones included in the overlying till or boulder clay. The main ice-sheet bore down upon Glasgow from the north-west, crossing in its passage the by no means inconsiderable hill-range of Kilpatrick, which forms the extension of the Campsie Fells westward from Strathblane to Dumbarton. Many visitors to Glasgow may not have had elsewhcre so good an opportunity of sceing glacial striæ as is afforded here, and it may be well to note a few places where characteristic examples are, or at least till recently were, to be met with. Among them are the Possil and Woodside Quarries and the Necropolis Hill.* Within an hour by rail beautiful examples may be seen on the Kilpatrick and Strathblane hills;† on the sandstones of Craigend Muir, near Campsie; on Dumbarton Rock; in the Town Quarry, Paisley; on the Braes of Gleniffer; on the sandstones skirting the northern slope of the Braes; or still better at Barmufflock Dam, near Bridge of Weir. A capital idea of the general direction of ice-flow may be gathered from a map in Mr. J. Geikie's work, "The Great Ice Age," showing all the striæ hitherto mapped.

* The precise localities are marked on the Geological Survey Map, Sheet 6, Lanark.

* See the Geological Survey Map, Sheets 1 and 6, Lanark.

† Geol. Survey, Sheets 23, Dumbarton; and 27, Stirling.

On the outskirts of Glasgow, especially to the west and south, a stranger will be struck by the number of smooth-backed hills, shaped like eggs, lying on their sides, and half-buried. These hills rise to the height of one or two hundred feet. They are the drums or drumlins of Celtic geologists, and are formed of boulder clay, resulting from the passage of great sheets of ice. Sauchiehall-street lies between two drums. On the occasion of the last meeting of the British Association in Glasgow, the late Professor Agassiz found in one of these drums, then laid bare for building operations, the key to the geology of the Ice age. Similar sections will be found at present where new streets are rising on the sides of the Great Western road.

The drums form the shores of, or islands in, an immense deposit of stratified fine mud and clay, which rises to a height of 100 feet above the sea. It contains great quantities of marine and estuarine shells, frequently of species now living only in Arctic seas. This interglacial sea corresponded in extent with the triangular flat which may be called the Paisley basin, and which is, roughly speaking, bounded on the south by the Johnstone Canal, on the west by a line from Johnstone northward to Bishopton, and on the north-east by a line parallel to and about a mile north of the Clyde, between Old Kilpatrick and Partick. It must have communicated with the ocean by one or perhaps by two straits, the one at Kilburnie and the other at Erskine Ferry. It has been suggested, with some probability, that glaciers may from time to time have pushed down the Loch Lomond valley, and so dammed up the northern or present outlet of the inland sea. In that case the sole outlet for the inland sea, fed by all the drainage of the Upper Clyde, would be down the valley of the Garnock to Irvine. The bottom of the clay deposits is in many places below the present sea-level, so that the inland sea filled up a rock basin nearly forty square miles in extent.

The clay deposits of the Paisley basin rest, as has been indicated, on boulder clay. Their interglacial character is settled not less by their fossil contents than by the direct superposition (*teste* Rev. Wm. Fraser and others), at Paisley and elsewhere, of a true boulder clay. It is not surprising, considering their date and their nature, that they have suffered much denudation during and since the gradual uplifting of the land. Several pauses in the elevation lasted long enough to admit of the erosion of marine terraces, notably one at 50 feet above the present sea-level, and local hollows have been filled up with post-glacial sea-deposits, which it is a matter of the greatest difficulty to separate from the interglacial, as they occur in the same flat and at the same level, and are made up of precisely similar material. Besides the marine deposits, the Clyde and the Black and White Cart have covered large portions of the flats with their alluvia. To the north of the Glasgow and South-Western Railway, from Ibrox Station to Johnstone, a succession of clay-pits for brick and tile manufacture affords an inexhaustible field for collectors of glacial and post-glacial shells. Many valuable papers and lists by Messrs. Geikie, Crosskey, Robertson, Young, Burns, Bennie, Coutts, and others, will be found in the "Transactions of the Glasgow Geological Society." Some of the members of the society possess unequalled collections of glacial shells.

Of kaims or eskars the immediate neighbourhood of Glasgow furnishes few and not very striking examples. A railway journey of less than an hour, however, will take one to Falkirk or Polmont, where for several miles a characteristic kaim runs parallel with the Edinburgh and Glasgow Railway. One of the highest in Scotland, reaching 1,280 feet above the sea, and therefore indicating a depression of the land to that extent at least during part of the Glacial epoch, will be found crossing the valley of Earl's Burn in the Campsie Hills, about six miles south-west of Stirling.

Of stratified tertiary deposits no vestige is known to remain between the Grampians and the Southern Uplands. But within easy reach of Glasgow are to be seen many of those persistent dykes of basalt rock, which, as Professor Geikie has shown, were connected with the outbursts of volcanic activity, which in Miocene times furnished the basaltic lavas of Mull, Eigg, and the Giant's Causeway. In the region with which we are concerned they run from east to west. One of them has been traced with slight intervals from the Firth of Clyde, near Helensburgh, to the Firth of Forth, near Grangemouth. Faults cross it at every angle without deflecting its course, and it pays no regard to the direction or degree of dip of the stratified rocks. It crosses the Lower Old Red sandstone, and all the subdivisions of the carboniferous formation represented in Scotland, including the enormous thickness of porphyritic lavas interbedded with the cement-stones below the carboniferous limestone series. It may be followed (with the Geological Survey Maps, Sheets 27, 28, 29, and 23, Stirling, in hand) across the Campsie Fells, by starting at Ballewan farm-house, near Blanefield station, Strathblane, and walking to Denny, a route affording in clear weather a magnificent view over Glasgow, the mouth of the Clyde, Edinburgh, and the "black country" of Coatbridge and Airdrie, as well as glimpses of the lovely valleys of the Blane, and the "dark winding Carron." The enormity of the strain that cleft a passage for the molten rock, so direct, so long (40 miles at least), so wide (sometimes 200 feet), and through formations of every degree of tenacity, may excite the admiration of even the most blasé of geologists. Similar dykes may be traced from Mugdock Castle, through the Loch Katrine

aqueduct by the north side of Craigmaddie reservoir to the middle of Blairskaith Muir. Two others run from the Clyde, at Rashielee, near Erskine Park, diverging slightly as they go westward. Another runs along the north side of the railway tunnel west of Dumbarton.

The district accessible from Glasgow is a perfect blank, in so far as regards any record of the secondary age. Scotland probably kept her head above the water for most of the time, while Triassic birds and Labyrinthodons, Liassic and Oolitic Ammonites, the Plesiosaurus, and the teeming life of the Chalk period flourished in English and continental seas.

Stripped of the superficial deposits, Glasgow lies immediately on palæozoic rocks. The ancient village doubtless owed its origin to the facilities afforded by the lowest possible bridge over the Clyde, admitting of a passage between the settled districts of Carrick and Lennox. But the importance of the modern city results directly from its geological position in the midst of the coal-measures and carboniferous limestone. If Mauchline be considered in the neighbourhood of Glasgow (and it is less than two hours distant by rail), igneous and sedimentary rocks of Permian age may be seen overlying the coal-measures.* The Permian red sandstone of Mauchline is a notable building-stone. The great quarries of Mauchline may be visited together with the romantic scenery on the river Ayr at Ballochmyle.

Returning to Glasgow, we find ourselves at the western end of the great basin of the coal-measures, which occupies a large portion of the counties of Lanark and Linlithgow, and stretches northward across the Firth of Forth to the base of the Ochils in Clackmannanshire. In spite of undulations of the strata, and fracture by innumerable faults, this great coal-field is fundamentally a long trough, varying from six to fifteen miles in breadth, with an axis running from S.W. to N.E. through Hamilton and Grangemouth. The thickness of the coal-measure strata here has been estimated by Mr. James Geikie† at 2,100 feet, with eighteen workable coal-seams, amounting to from 40 to 70 feet in aggregate thickness. But important as the coal-seams are, Glasgow could never have reached its present position except by the aid of the blackband ironstones, so liberally scattered throughout the coal-measures. A visit to the Govan Colliery, on the south side of Glasgow, or to the ironstone workings of Wishaw or Coatbridge, will amply repay the visitor, whether his object be fossil-collecting or the study of the processes by which the mineral wealth of Glasgow is made available. Where every quarry and every "blaes"-heap at

* See Geological Survey, Sheet 14, Scotland (1-inch), and explanation by Prof. Geikie.

† "Journal of the Iron and Steel Institute," 1872.

every pit-mouth is eloquent with the story, it would be useless to point out special localities for the study of the physical geography and life of the Coal period.*

The millstone grit, underlying and consequently coming to the surface in a belt surrounding the coal-measures, presents few features of interest, with the exception of the fireclays extensively mined at Garnkirk. The series is, at least in the neighbourhood of Glasgow, entirely wanting in the boldly-marked subdivisions characteristic of the millstone grit of England.

The west end of Glasgow is built on the carboniferous limestone series. This series, in Scotland, is well known to differ vastly from the English type, the uninterrupted marine conditions prevailing in England during the period having given place to repeated alternations of land and sea north of the Scottish border. Hence, while in England the whole period is represented by limestones, in Scotland only a few thin beds of limestone are intercalated among subaërial and purely sedimentary beds. There is around Glasgow quite *enough* of limestone for building and agricultural purposes; and besides, the coal and ironstone seams of carboniferous limestone age are not far behind those of the coal-measures in number and value. The top of the series dips beneath the millstone grit, along a crooked line, from Glasgow to Kirkintilloch, while its base is marked by the Campsie, Kilpatrick, and Renfrewshire hills, and the Braes of Gleniffer and Cathkin. From these trappean heights the carboniferous limestone series is frequently separated by faults; but its true relations may be seen at Craigend Muir, alongside of the turnpike road from Milngavie to Strathblane;† at Douglas Muir, west of Milngavie;‡ at Elliston, near Howood; § and elsewhere. In these places the lowest beds of the series rest on beds of porphyrites or melaphyres (old lavas), or of volcanic ashes, which mark the last efforts of an immense period of volcanic activity.

Besides limestones, coals, and ironstones, the Carboniferous limestone series near Glasgow yields large quantities of sandstone for building purposes, oil-shales, and alum. The latter impregnates a shale between the main limestone of Campsie and Hurlet, and its underlying coal. Oil-shales are extensively worked at Linnwood, near Johnstone. A great thickness of an admirably pure and durable white sandstone overlies the "Rough," or "Cowglen," or "Index" limestone, and is quarried extensively at Bishopbriggs and Giffnock. The spacious galleries and

* Sheet 23, Scotland (1-inch), of the Geological Survey Map, contains in great detail the part of the Lanarkshire coalfield to the south of Motherwell.

† Geological Survey (6-inch), Sheet 27, Stirling.

‡ Ibid., Sheet 23, Dumbarton.

§ Ibid., Sheet 11, Renfrew.

arches of the Giffnock quarries rank among the most interesting sights of Glasgow.

The Carboniferous limestone series of the west of Scotland is very rich in fossils. No limestone need be searched in vain, and every blaes-heap is full of organic remains. Perhaps, of all the limestones, that of Broadstone, near Beith, has yielded the greatest quantities. Its polished surfaces, fantastically marked with encrinites, corals, and shells, cut at every possible angle, form a "marble" once in great request for ornamental purposes. In the older houses of the better class, one lights every now and then on a mantelpiece of this material, which is quite a little museum of carboniferous limestone fossils.*

We are now coming upon rocks which are at once more ancient and more distant from the city, which we regard as our starting-point. Glasgow stands geologically, as has already been remarked, in the centre of a basin, and therefore the lower formations may be reached, either by boring vertically for a few thousands of feet, or by walking a horizontal distance of a few miles. We could find the base of the carboniferous limestone series by sinking five thousand feet below Glasgow (the thickness of the millstone grit and carboniferous limestone), or by walking till we found the subjacent beds rising to the surface. This they do at a distance varying from five to twelve miles.

The formation thus reached is composed of alternate beds of volcanic lavas and ashes, and builds up the fine trappean ranges of Campsie, Kilpatrick, and Renfrewshire. These lavas (porphyrites and melaphyres) and ashes dip, as the Kilpatrick Hills, under the carboniferous limestone series, re-emerge and again disappear to the south of Glasgow as the Cathkin Braes, and rise once more in the Muirland, at the heads of the Avon and Irvine. A few sedimentary beds, other than ashes, intervene between the lava-flows in the Kilpatrick Hills. The whole range is famous among mineralogists for beautiful specimens of zeolites. The extreme fragility of most of these minerals makes it desirable to resort for specimens to newly-opened quarries. Some characteristic specimens of Prehnite are, however, still to be had in the rubbish excavated from the Bishopton tunnel on the Greenock Railway.

The base of the volcanic series may be seen resting on sedimentary rocks of Lower Carboniferous age at Fintry, Strathblane,† Overton, near Bowling, Ardrossan,‡ and the island of Little Cumbrae, in the Firth of Clyde, as well as in Bute. On re-emerging on the eastern side of the Lanarkshire coalfield as the Garlton Hills, the volcanic series is found to have dwindled away to a fraction of its thickness on the western side, while a great series of sandstones, cement-stones, and shales, including oil-shales, has largely taken its place. The meaning of this is, that while the volcanos on the east had ceased to be active, and the quiet deposition of sediment (for the most part in lakes) was going on, those on the west still vomited lavas and ashes. A considerable thickness of cement-stones and shales does indeed underlie the trappean series on the west side—notably at Strathblane; but the upper portion of the series, containing the oil-shales of Mid Calder, is not represented.

By far the most interesting record still remaining of the volcanic activity of this period, affording, as they do, views of the internal structure of volcanos, are the "necks" or "pipes," which along a line from Ardrossan to Fintry, pierce the older rocks where these emerge from beneath the bedded traps and ashes. The necks are isolated dome-shaped hills of coarse volcanic agglomerate, or of melaphyre, or both. They are not the original cones from which the lavas and ashes were thrown out, for these, of course, towered above the deposits, which they spread around their bases, and have disappeared bodily, their sites having been probably at one time deeply buried under deposits of Carboniferous Limestone age. The necks then are the plugged-up vents of the volcanos, originally deep-seated, but now standing up boldly as hills, as they have yielded more slowly to the wasting power of denudation than the softer rocks through which they pierce. Fine examples (especially the two last-named), are Diamond Hill, near Fairlie; Knock Hill, near Largs; Dumbarton Castle Rock; Dumbuck, near Bowling; and Dumgoyn, in Strathblane.

Still receding from Glasgow westward, the red sandstones appear, which form the lower subdivision of the calciferous sandstone series. They extend over Dumbarton Muir, and the eastern shore of the Firth of Clyde, from Greenock to Ardrossan. They also bulk largely in the composition of Bute and the Cumbraes. They are supposed to be lake-deposits, and, at least in the neighbourhood of Glasgow, are almost destitute of fossils, even the cornstones and limestones of the series having been searched in vain. Elsewhere, these sandstones are called Upper Old Red. They lie on the lower old red sandstone, unconformably, that is to say, the deposition of the lower old red sandstone ceased in the area in question, the lake-bottom became dry land, and the rocks deposited in the lake-bottom suffered atmospheric denudation before another depression admitted of the superposition of the upper old red sandstones.

The lower old red sandstone may be seen in the course of a day's excursion around Glasgow, although the unravelling of its structure may be-

* For lists of carboniferous limestone fossils see Armstrong, Young, Craig, and others, in "Trans. Geol. Soc. Glasgow." Also R. Etheridge, Jun., in Explanations of Sheets 14, 22, and 23, Geological Survey.

† See Geological Survey, Sheet 27, Stirling.

‡ Ibid., Sheet 22, Scotland (1-inch).

the task of years. Except land-plants, no fossils have been discovered in the formation nearer than Bridge of Allan. Further north, as everybody knows from the writings of the late Hugh Miller and others, the remains of a wonderful series of armour-plated fishes are abundantly present. The grey flagstones, containing the plant-remains, are best seen in the quarries in Cameron Wood, near the foot of Loch Lomond. The lake steamer from Balloch to Balmaha takes the passenger close by the islands of Inch Murrin, Torrinch, and Inch Cailloch, giving him a good view of the great conglomerate near the base of the old red sandstone. This conglomerate may be more closely inspected at the pass of Balmaha, and may be followed inland in a straight line, as its beds crop out nearly on end, through Aberfoyle to the lower end of Loch Venachar. In the Menteith Hills it forms a very striking feature of the landscape. Volcanic rocks of this age occur in the Ochils, and in the neighbourhood of Crieff and Comrie.*

The Scottish old red sandstone is now generally admitted to be a fresh-water formation, contemporaneous with the Devonian marine formation of England and Belgium. Along a line from Balmaha to Stonehaven, on the east coast, a fault whose downthrow must amount to four or five miles, separates the old red sandstone from the "primary rocks" of the early geologists.

We have now reached a minimum distance of 20 miles from Glasgow, and have passed over the edges of strata whose total thickness is greater than would be believed, and which, therefore, we refrain from mentioning. The Highlands are mainly composed of the so-called "primary" rocks, whose structure is a subject much too wide for the present sketch. Suffice it to say that they are older than the old red sandstone, have been crumpled into folds, metamorphosed, upheaved, denuded, and to a large extent covered over with newer, but still enormously ancient accumulations. Within the last few years they have been recognized through Mr. C. W. Peach's discovery of fossils, as belonging, for the most part, to the Silurian age, some Cambrian and Laurentian rocks underlying the Silurian in the far North-western Highlands. A general idea of the Silurian area may be gathered in the course of a sail up Loch Long and down Loch Lomond, or at Dunoon or Arran.

It only remains to be added that a geological excursion should never be undertaken without an accurate map. It is astonishing how easily the grand operations of nature may be misinterpreted for want of this simple corrective. The contoured maps of the Ordnance Survey* are obtainable at a trifling cost, contain a fund of information regarding roads, levels, &c., and render the traveller independent of the "intelligent native." Putting one's geological observations on accurate maps is excellent practice, and the habit, if cultivated, would

> "From many a blunder free us,
> And foolish notion."

* A report of a lecture, by Prof. Geikie, to the Glasgow Geological Society, published in *Nature*, vol. xiii. p. 389, will enable the reader to appreciate the importance of the old red sandstone as a sedimentary formation.

* For Glasgow, Sheets 22, 23, 30, and 31, on the scale of 1 inch to the mile, are sufficient.

THE MICROSCOPE AND MICROSCOPIC WORK.

No. IX.—By F. Kitton.

With the close of the last century the Microscope seems in some measure to have fallen into disuse. Very few works, either on its construction or on the work done by it, seem to have been published. Opticians were unable to produce any better instruments, so far as the optical part was concerned, than those used by Leeuwenhoek, Baker, and others, whose labours we have been reviewing. Attempts were made by M. Charles, of the Institute, to construct a chromatic objective, but these attempts were unsuccessful. In 1812 Sir David Brewster proposed to make both single and compound microscopes achromatic in the following manner: A drop of fluid of greater dispersive power than the convex lens which formed the objective was placed on the object about to be examined. The lens was then immersed in the fluid, thus forming a plain concave lens below the convex one. This plan improved the performance both of double and single instruments; but, as may be imagined, this method was very troublesome. He afterwards contrived a more permanent form of achromatic object-glass by placing some "butter of antimony" (sesqui-chloride of antimony) between a meniscus and a plano-convex lens. This was capable of being renewed when necessary.

The grand desideratum was, however, a compound objective which should be aplanatic, and Professor Amici, of Modena, made many experiments to improve the achromatic objective, but with very moderate success. He therefore turned his attention to the reflecting microscope, and with this he was so successful that he gave up the refracting instrument for several years.

With these instruments many test-objects were resolved, but the loss of light from so many reflections must have been very considerable. The following diagrams will enable the reader to understand the structure of the reflecting microscope. Fig. 109 represents Amici's plan: *a* is a concave speculum, upon which the image of the object, *c*, is reflected

by the little plane mirror, *b*, and brought to a focus at *d*. Fig. 110 shows the arrangement adopted by Mr. Tulley; the object, *c*, is magnified by the speculum, *a*, and thrown upon the plane reflector, *b*, and from this reflector towards the eye-piece.

These diagrams represent the reflectors about the actual size, and were screwed in or on to the body like the modern objective.

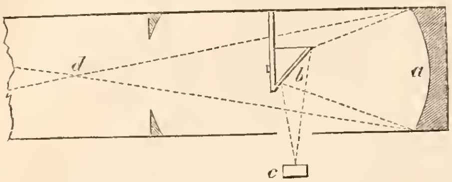

Fig. 109. Reflecting Arrangement of Amici.

The origiual dimensions of Amici's Engiscope were as under:—Elliptic metal 1 iuch aperture, and $2\frac{6}{10}$ inches focus; diameter of diagonal mirror, $\frac{1}{2}$ inch; length of tube, 1 foot.

Dr. Youug also turned his attention to the improvement of the reflecting microscope. The following is his description of the structure of one of these instruments, or, as they were theu called, Engiscopes.

"Mr. Cuthbert and myself became the parents of the instrument *in its most* effective form, as follows. Mr. Cuthbert had devoted a very large portion of his time to the making of metals for dumpy Gregorian Telescopes, frequently having an aperture of 3 inches to a focus of only 5; he was, therefore, exactly cut out for a maker of Engiscopes. I had chanced to be introduced to him when he had just made a microscope on Amici's priuciple, having an aperture of an inch and a half to a focus of three inches, with a body one foot iu length. Just about this period I had discovered the properties of the feathers and scales of insects as test-objects; we tried the instrument with them; but though the figures of its metals were excellent, we found its performance unsatisfactory. I therefore recommended Mr. Cuthbert to construct a pair of metals of which the concave should be only half an inch focus, and to shorten the body to four or five inches. He accordingly succeeded in making a pair of ·6 of an inch focus and ·3 of aperture, which gave a delightful foretaste of what might be expected from reflecting engiscopes when perfected. Its body was inserted into the cleft socket of the stand of a small spy-glass, Mr. Cuthbert happened to have by him, and I lent him the stem of a single microscope, made by Samuel Varley, to attach as a dependent bar to the objective end of the body, which happened to suit it very well, and *this arrangement constituted the original pattern of the instrument*. . . . . I also particularly explained to him a method by which a metal of an unlimited angle of aperture might be made to act on transparent bodies without increasing the size of the small metal.*

"In relating these anecdotes I am afraid I shall be justly accused of egotism, but I am sure that by-and-by, when the invention shall have obtaiued *a venerable beard of due length, they will be read with pleasure*." Dr. Goring and Mr. Pritchard

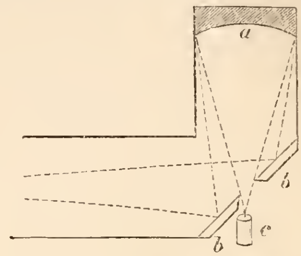

Fig. 110. Reflecting Arrangement of Mr. Tulley.

afterwards made this form of instrument with further improvements, or, as Dr. Goring puts it, "with final improvements, which my worthy coadjutor Mr. Pritchard and myself, by clubbing our wise noddles together (as we imagine), effected in it."

He then proceeds to describe the instrument, beginning with the "foundation," that is to say, the stand or pillar, ou which he gives his reasons for preferring a cruciform foot to a triangular one; at "the same time he admits that, if wanted to fold up together, iu order to pack up in small compass, the tripod is the preferable construction, for the cruciform must be made in oue piece. Mr. P., of course, makes them to suit the fancy of purchasers. I have no doubt he would, to oblige a good customer, mount an instrument on a mop-stick, or the top of au old brass candlestick, as Sir I. Newton did the original of his telescope."

The manufacture of reflecting microscopes received a severe check, at least in this country, "Mr. Cuthbert's eyesight having decayed, so that he can only work metals of small angular aperture, and no other artist being as yet capable of supplying his place." The solar focus and angle of aperture of the metals supplied with the reflecting engiscope were as follows:—

			Solar Focus.	Angle of Aperture.
No. 1	...	...	2 inches	$13\frac{3}{4}°$
2	...	...	1 inch	$18\frac{1}{3}°$
3	...	...	$\frac{6}{10}$ of an inch	$27\frac{1}{2}°$
4	...	...	$\frac{3}{10}$,,	$36\frac{1}{2}°$
5	...	...	$\frac{4}{10}$,,	$41\frac{1}{4}°$
6	...	...	$\frac{3}{10}$,,	55°

* "Vide my paper in the *Quarterly Journal of Science* of the Royal Institution, vol. xxi. p. 34, and pl. 1. In this tract will be found the first description of the *aquatic live-box*, which, like all other good things, is claimed by half a dozen fathers, while a bad thing is sure to have only one, or to be like a bastard without any father at all."

The angle of aperture of these reflectors was not much inferior to that of second-quality refracting lenses, but their performance was very far below that of the commoner achromatic combinations of the present day. This arose from several causes, the following being the principal:—First: The figure of the concave metal. This should be a true ellipse, a figure very difficult to attain. Second: the plane mirror must be perfectly flat. This is even of more difficult attainment, and can only be procured by working three metallic surfaces successively against each other. And supposing these difficulties overcome, there remains the adjustment of the two metals. In addition to these hindrances, the great loss of light arising from so many reflections of course has seriously injured the performance of the reflecting engiscope.

The reader will, no doubt, be curious to learn the cost of these instruments. According to Mr. Pritchard's catalogue, "the improved American engiscope, as described in 'Micrographia,'" ranged from £18 to £35.

This catalogue was published in 1837, the reflecting microscope holding its ground even after achromatic lenses had been successfully constructed.

In 1823, MM. Selligues and Chevalier in France, Frauenhofer in Germany, Anna in Italy, and Dr. Young and Mr. Tulley in London, turned their attention to the construction of achromatic objectives. M. Selligues was the first to make them of four compound achromatic lenses. The focal length of each combination was 18 lines (= $1\frac{1}{2}$ inch); the diameter, 6 lines; the thickness in the centre, 6 lines; and the aperture, 1 line. This objective could be used in combination or separate.

Mr. Tulley at the same time constructed an objective of $\frac{9}{10}$ of an inch, and an angle of aperture of 18°. This was probably the first English achromatic objective. Mr. Tulley afterwards added another combination, increasing the angle of aperture to 38°. To meet the requirements of the new glass, the old form of stand had to be very much modified. The construction of the new stand was undertaken by Mr. James Smith, the optician. This instrument had a mechanical stage, the first, it is stated, ever made in England.

(*To be continued.*)

THE GLAUCOUS AND THE GREAT BLACK-BACKED GULLS.

By P. Q. Keegan, LL.D.

AMONG the objects of interest which greet the explorer of the Arctic Seas, there is none more interesting than the magnificent sea-birds whose names stand at the head of this paper. Several of our Arctic voyagers bear testimony to the frequent occurrence of the Glaucous Gull among the cliffs, headlands, or low-lying rocks adjacent to various parts of the Polar seas. Prince Regent's Inlet, Baffin's Bay, and Davis' Straits are especially mentioned as favourite localities for the resort of this species. Away upon the loftiest pinnacles of the icebergs which tower above the surface of these sequestered seas, the bird may frequently be discerned; and invariably the trepidation induced by the approach of a ship occasions it to abandon its seat.

The flight of the Glaucous Gull is regarded by ornithologists as more buoyant than that of any other species of gull. When its volatile apparatus is completely expanded, it is observed to be lengthy, powerful, and eminently competent to battle effectively with the air. Its progress on the wing is remarkably slow and stately, as if the bird was under the influence of grave and solemn feelings.

Owing to the character of its habits, the gull now under review has been styled "the Burgomaster of the Seas." Amid the dark atmosphere of the northern climes, the spectacle of this bird swooping down with tremendous emphasis and impetuosity upon some unfortunate possessor of a tempting edible morsel, is eminently calculated to inspire a feeling of awe. The desolate solitude and solemn silence of these regions, too, is frequently disturbed by the fluttering wings and shrill, piercing cries of this beautiful sea-bird. As may have been anticipated, from the enlarged size, powerful build, and predatory proclivities of this noble bird, the quantity of food necessary to satiate its appetite is by no means inconsiderable. Its voracity has been frequently observed and commented upon by several of our Arctic voyagers. The excessively cold regions which it inhabits doubtless impart a tone and sharpness to its appetite which birds dwelling in a more temperate zone can never experience. In an old work on Arctic zoology it is related, that the Glaucous Gull "preys on dead whales, attends the walruses in order to feed on their excrements, and will even destroy and eat the young of the Razorbills. It also feeds on fish, and does not despise the berries of the *Empetrum nigrum*." Dr. Richardson also testifies to the fact, that one specimen killed on Captain Ross's expedition disgorged an auk when it was struck, and proved, on dissection, to have another in its stomach. The bird now under review, unlike the Divers, Guillemot, Gannet, &c., is firmly and evenly seated upon its legs, thereby being enabled to walk steadily and well. This circumstance is probably connected with its predatory, carrion-devouring habits. By maintaining a firm standing posture, it is capacitated to grasp, dissect, and devour the flesh from the bones of a carcase more effectually than it could possibly do if, like some of the aforesaid birds, it were compelled, whilst on shore to crawl along on its breast.

The specific characteristics of the Glaucous Gull

(*Larus glaucus*) may be delineated as follows:—The bill in the adult state is of a yellowish-white colour, except the inferior angle of the lower mandible, which is reddish-orange; the irides are of a straw-colour; all the plumage is nearly white, but there is a tinge of light slaty-blue over the back and wing-coverts; the legs and feet are of a yellowish-brown tint. The total length is from about 27 in. in some specimens to about 32 in. in others.

Co-equal in respect of dimensions, robustness of constitution, and imperious demeanour, with the sea-bird described in the preceding lines, the Great Black-backed Gull now comes under review. Whether soaring high above the waveless ocean, or desolate solitude of cliffs and headlands, where some mother-bird has planted her nest in apparent security, and assiduously attends to her breeding duties, the gigantic figure of this tyrant gull stalks abroad like a destroying demon, and ruthlessly swooping down upon some of the eggs, consumes them with immense relish.

In our latitudes, indeed, in low estuaries, or standing upon the muddy banks of some shallow bay far removed from human habitation, this bird may frequently be discerned in the cool, quiet air of the evening. He is surrounded by a company of minor gulls, &c., and appears heedless of prey, and completely immersed in the sedative pleasures of

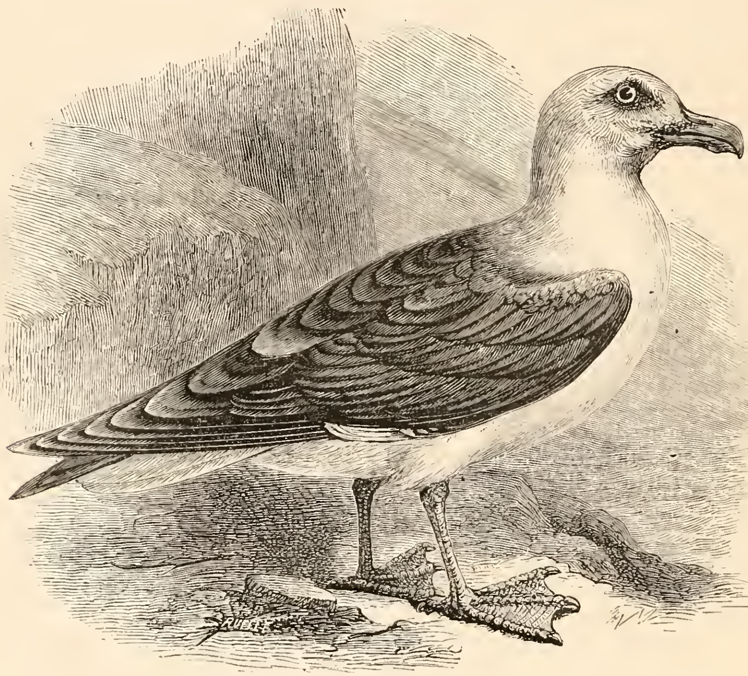

Fig. 111. Great Black-backed Gull (*Larus marinus*).

skimming nigh unto the billowy waters, the appearance and deportment of this magnificent bird claim our highest admiration. Though not nearly so handsome as the Glaucous Gull, yet he is equally endowed with qualities to which the epithet "noble" may be fairly applied. Like that bird, too, his appetite is apparently insatiable, and he perpetually hovers about the localities where instinct or experience has taught him to seek whatever may satisfy his incessant cravings. He is unable to dive, and his swimming apparatus is not of the highest order; but the immense power and sweep of his wings amply compensate for these defects, and suffice to strike terror into the breast of many a minor gull or tern. Away amid the quiet contemplation. Perhaps he is reposing after his labours, or mayhap he is placidly awaiting the turn of the tide to yield unto his capacious jaws some dainty morsel of greasy offal, &c., which has floated downwards from the neighbouring city. He seems to have a special predilection for fatty or oily food; for, when he is out upon the deep, where the carcase of some dead whale or fish lies gleaming in the sun, he is observed to carefully alight thereon, and frequently to absolutely incapacitate himself for further exertion by reason of the immense quantity of carrion he has consumed.

The bird we are noticing is found around our coasts throughout the year. It is also frequently noticed on the Irish coast in the vicinity of bays,

harbours, &c. I remember seeing two or three specimens of this gull standing in conjunction with a small flock of herring gulls upon a sandbank in one of these inlets of the sea; while at a respectful distance away two or three solitary black cormorants appeared preening their wings in the full blaze of the evening sun. Several of its breeding-places have also been discovered, as at Lundy Island, Bass Rock, Hearn Head, &c., and the feathered inhabitants of the Orkney and Shetland Islands are not freed from the undesirable visits of this imperious bird. It is not so frequently discerned in the Arctic regions as the Glaucous Gull, as our Arctic voyagers do not often mention it in their journals, but it is tolerably common along the seaboard of Labrador and Newfoundland. In general anatomical conformation, size, and predatory endowments, it so strongly resembles the Glaucous Gull, as to suggest the notion that they were descended from a common ancestor. The specific characters of the Great Black-backed Gull (*Larus marinus*) may be briefly indicated as follows:—The feathers of the crown of the head, about the eyes, and the nape of the neck, are white, with a longitudinal stripe of bright brown in the middle; the front, throat, neck, all the lower parts, back and tail, are pure white; top of the back, scapulars, and the whole wing, are of a deep black shaded with bluish colour (in the young state there are bands of reddish-white on the wing-coverts). The bill is whitish-yellow, except the angle of the lower mandible, which is bright red. The iris is yellow, with some brown markings intermingled. The feet are dirty white. The total length of the bird is about 27 inches.

Two principal points present themselves for elucidation upon the contemplation of some of the habits and peculiarities of this sea-bird. In the first place, we may indulge in a little speculation regarding the reason of the excessive vigilance and shyness of the approach of man manifested by it. While in the adult condition, fowlers find it very difficult to shoot, owing to the impossibility of bringing it within range, although it has been frequently remarked, that the immature bird is not nearly so cautious. Now, we know that several European naturalists who have visited desert islands and other localities comparatively uninhabited by man, have found the birds there exceedingly tame, and apparently destitute of any fear of human beings. Even the descendants of these birds, although familiar with man, still exhibit very little of this species of fear; therein furnishing a contrast to those which haunt localities where they have been persecuted by the human race for ages past. Physiologists, therefore, have arrived at the conclusion that this protracted experience of the dread consequences of the presence of humanity gradu-

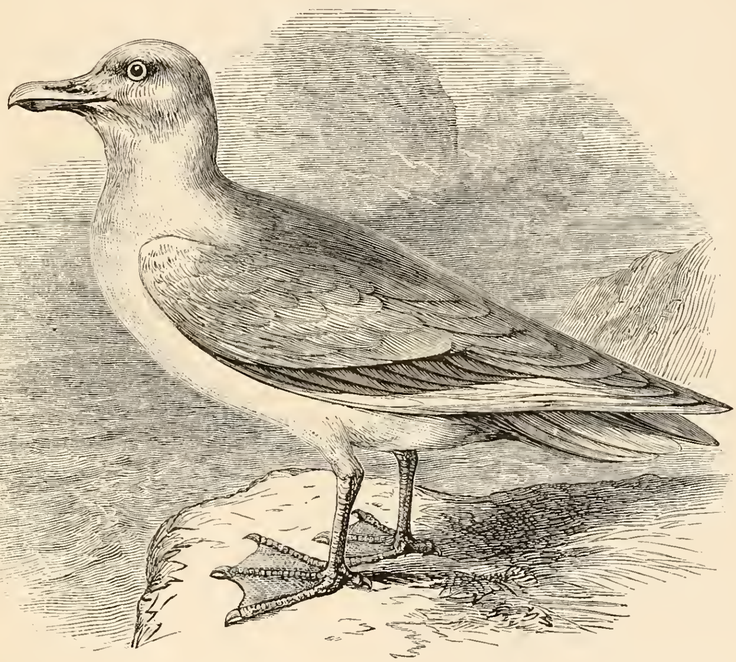

Fig. 112. Glaucous Gull (*Larus glaucus*).

ally becomes *embodied*, as it were, in the constitution of the bird, a peculiarity which they transmit to their descendants, who thereby exhibit a species of *immediate* or *intuitive* apprehension, which their progenitors required years of experience in order to build up. The question is started, why does the Great Black-backed Gull (a large and powerful bird) exhibit such indubitable symptoms of dread at the sight of mankind, while other species (such as the Common and the Herring Gulls) fly and hover about, with apparent unconcern, localities where the congregation of human beings seems most dense and formidable? The latter species, indeed, do commonly, as is well known, keep at a respectful distance, for they fly much lower on Sundays than on week-days; thereby manifesting a degree of respectful awe in the presence of the lords of the creation. Now the fact that the immature Great Black-backed Gull does *not* exhibit symptoms of trepidation in the situation now indicated, would seem to be inconsistent with this doctrine of the hereditary transmission of acquired psychical aptitudes. But if we take into account the well-known foolhardiness of youth, and the insatiable voracity exhibited by this gull as connected with its corporeal or mental development, perhaps a sufficiently adequate and satisfactory explanation of this exceptional phenomenon will be furnished.

Another peculiarity worthy of special comment with regard to the bird now under review, is that it associates with members of other species, thereby giving rise to a hybrid brood. One consequence of this proceeding is that it frequently baffles the efforts of a naturalist who is trying to discover the genus and species of a particular bird that has just fallen under his gun. Indeed, the two gulls which we have dealt with in this paper have been considered to be the same species, or at least mere varieties of the same species, and thus have been frequently confounded together. As they are both noble specimens of bird life, they may, however, surely be permitted to associate with other less robust, less developed individuals, in order, if possible, to impart to their offspring some of their noble qualities. In the more diminutive or less developed forms of swimming birds, we do not observe such an intermixture of different species, or such a confounding of fundamentally different forms; and taking this fact into consideration, we may feel constrained to regard this phenomenon in the case of the Great Black-backed Gull as a happy provision of Nature designed to improve and elevate the corporeal character of some of the nobler forms of Natatores.

Good Red Crag Fossils for Upper Silurian ditto.—J. T., 192, Piccadilly, London.

THE POTATO FUNGUS.

Germination of the Resting-spores.

BY WORTHINGTON G. SMITH, F.L.S.

THE following is Mr. Smith's account of this most important discovery, communicated to the *Gardeners' Chronicle*:—

Before describing the germination of the resting-spores of the fungus which causes the Potato disease, it will be well to briefly state how these resting-spores were obtained, and how preserved alive in a state of hybernation for so long a period as a whole year. I last July obtained the oospores or resting-spores by keeping potato-leaves and tubers continually moist. For many years past moisture has been well known to be capable of greatly exciting the growth of *Peronospora infestans*, and De Bary, in his recent essay, classes the Potato fungus with "other water fungi." Mr. C. Edmund Broome, of Batheaston, who is known as one of the first cryptogamic botanists of this country, repeated my experiments in the following manner: He selected potato-leaves badly infected with Peronospora, partly crushed them, and placed them in a saucer of water under a bell-glass. The saucer was kept in a sloping position, so that the leaves (being partly submerged) were allowed to absorb the water naturally. The result was that he obtained an enormous number of resting-spores in all parts of the leaves, many being within the spiral vessels and hairs. These resting-spores were in every way identical with mine, and they could only belong to the Peronosporeæ or Saprolegnieæ, because similar bodies are unknown in other families of fungi. The first-named family has jointed threads, the second bears threads without joints. Now as the threads seen by me, and last year illustrated in connection with the resting-spores, had jointed threads, they must belong to Peronospora, and not to Saprolegnia. As there is no other Peronospora than *P. infestans* known to grow upon the Potato plant, it is clear that the resting-spores cannot rationally be referred to any other than the Potato fungus. Added to this I last year saw the secondary bodies clearly growing from the Peronospora threads. I attach great importance to the jointed threads, because De Bary, when he figures Artotrogus from "Montagne's original specimen" ("Researches," p. 258), shows the threads with many septa. From the first I have said that Montagne's Artotrogus and the bodies discovered by me are the same. That both belong to Peronospora the sequel will prove.

It was of the highest importance that these resting-spores should be preserved alive till the time arrived for their renewed activity, and with this purpose in view I preserved the material in which the resting-spores were present in sealed bottles, each bottle containing more or less pure water or expressed

juice of horse-dung diluted with water. As I was quite in the dark as to the habits of these resting-spores, of course I did not know what to do for the best, or what the result of my experiments would be. I have already described how these resting-spores at first floated on the surface of the water, how they at length deposited themselves in the sediment at the bottom, and how, on opening one of the bottles at the last meeting of botanists at Hereford, the resting-spores were found still intact and apparently alive. Happily for me, nearly all my spores retained their vitality. Mr. Broome, being equally uncertain with myself, trusted to chance, and chance so far favoured him that all his resting-spores in the slanting saucer of water well retained their life. It might have been (and even was) said that possibly some fungus foreign to the Potato fungus had got into my material; but if so, it must be regarded as a coincidence in the highest degree extraordinary that Mr. Broome should also get the same new and foreign fungus in his Peronospora material,—a body so puzzling in its nature as to be referred to no less than eight different species of fungi.

All who have studied the habits of the lower fungi know the extreme difficulty of preserving the specimens alive. This difficulty almost amounts to an impossibility. The fungi under study may be present one day and all gone the next; a few drops of extra moisture or a slight current of dry air is sufficient to destroy or collapse the whole lot. Besides this, myriads of other parasitic fungi, and whole tribes of infusoria, commonly make their appearance, and prey upon the material that is desired to be preserved.

Now one of the most extraordinary facts about the recent Potato investigations in this country is this. These other fungi and infusoria have not to any damaging extent appeared. Since I opened my sealed bottles last April, I have kept the material under a bell-glass, and there has been no offensive odour, and to no appreciable extent have there been any moulds, infusoria, or parasites except *Peronospora infestans* itself, and the other fungus, which is equally destructive to potatoes, and known under *Fusisporium Solani*. In investigating the Potato disease, it was almost as important to discover the entire life-history of the Fusisporium as the Peronospora, and fortunately the materials preserved gave a perfect clue to the entire life-history of both. Mr. Broome's material has in the same manner been free from an excessive number of other fungi and infusoria.

The germination of the resting-spores was awaited with the greatest anxiety, and as I never knew from one day to another whether or not these bodies might all collapse and perish, I was under the necessity of dividing the material, and keeping a constant look-out for results under different conditions. With this object in view, therefore, I kept some of the bodies moist in pure water, others in diluted expressed juice of horse-dung, others in expressed juice of fresh potato-leaves, others upon extremely thin slices of potato and on crushed potato-mash, others in saccharine fluid, others in nitrogen gas, some between pieces of glass kept constantly moist, some upon broken tile (also kept constantly moist), and some upon potato-leaves as they grew upon the living plant. Besides this I have had a quarter of a hundred of slides kept damp, and under examination every day (almost night and day) for the last three months. All these preparations I have kept constantly and uniformly moist under darkened bell-glasses, for darkness invariably assists the growth of spores of all sorts.

The first new fact worthy of note is this: many of the resting-spores grew in size during nine months of their rest to twice their original diameter, or about four times their original bulk, and their aspect gradually changed from almost smooth, semi-transparent bladders to brown, more or less rough and warted or echinulate spheres. These latter brown, mature bodies were quite the same in character with those so sparingly seen last June and July. How they arose last year no one saw, but probably the wet weather of the early summer caused their appearance. It does not follow, because the resting-spores have taken a year to artificially mature with me, that therefore they always take a year to ripen; it is quite possible that, in a state of nature and under different conditions, they may mature rapidly. At any rate, two sorts of bodies were seen together last year, transparent smooth bodies and rough brown ones. I considered them to be different states of the same resting-spores, and subsequent facts have proved my supposition to be quite correct.

The top row of illustrations on fig. 113 shows characteristic conditions of the almost mature reproductive bodies as drawn in April last. At A is seen the oospore (or resting-spore) within the oogonium (bladder which holds the resting-spore); at B may be seen two resting-spores within one oogonium, and at C three resting-spores within one oogonium; whilst at D is shown a double oogonium—two oogonia coalesced, and each oogonium containing a resting-spore.

At the end of April and beginning of May last I began to see the first signs of germination, and at this time many of the oospores proved effete; the oogonium cracked at E, or became broken into atoms, as at F, discharging a bladder, as at G, which perished in fine dust, as at H.

As the month of May progressed, many of the resting-spores became dense and dark, with the oospore occupying the whole of the oogonium, as at I: this condition is different from that of the body A, for in this the resting-spore, being not quite mature, does not yet occupy all the oogonium, but

floats within from side to side, as the object happens to be moved under the microscope. J shows the contents of oospore being broken up into zoospores; K shows the zoospores within still more clearly, and where they are giving an echinulate appearance to the bladder within (an appearance adverted to lately by Mr. Berkeley); L shows the bladder from within the oospore being discharged from the oogonium after the manner of Cystopus, with the contained zoospores: this bladder frequently breaks up into dust, as at M, setting the zoospores which are at present quiescent free, as at N; two tails shortly appear on these latter bodies, and at a certain period of their growth the anterior cilium, or tail, is pushed straight out, as seen at O; the posterior tail then quivers with an undulatory movement, and the zoospores sail out of the field of the microscope. How long the zoospores live it is difficult to say, but probably somewhere between twelve hours and a week; at length they come to rest, as at P, when the tails fall into fine dust. Some zoospores burst and at once perish, as at Q, whilst others throw out threads of mycelium, R, which threads are destined at length to bear the conidiophores of the Potato fungus in its new generation. The zoospores thus obtained were planted on the foliage, and upon thin slices of potato supplied from a frame by Mr. Alfred Smee. On these materials they at once produced mycelium and small conidiophores, which, without doubt, belonged to Peronospora; but as better results were afterwards obtained from resting-spores similar to I, fig. 113, the figures are not here engraved.

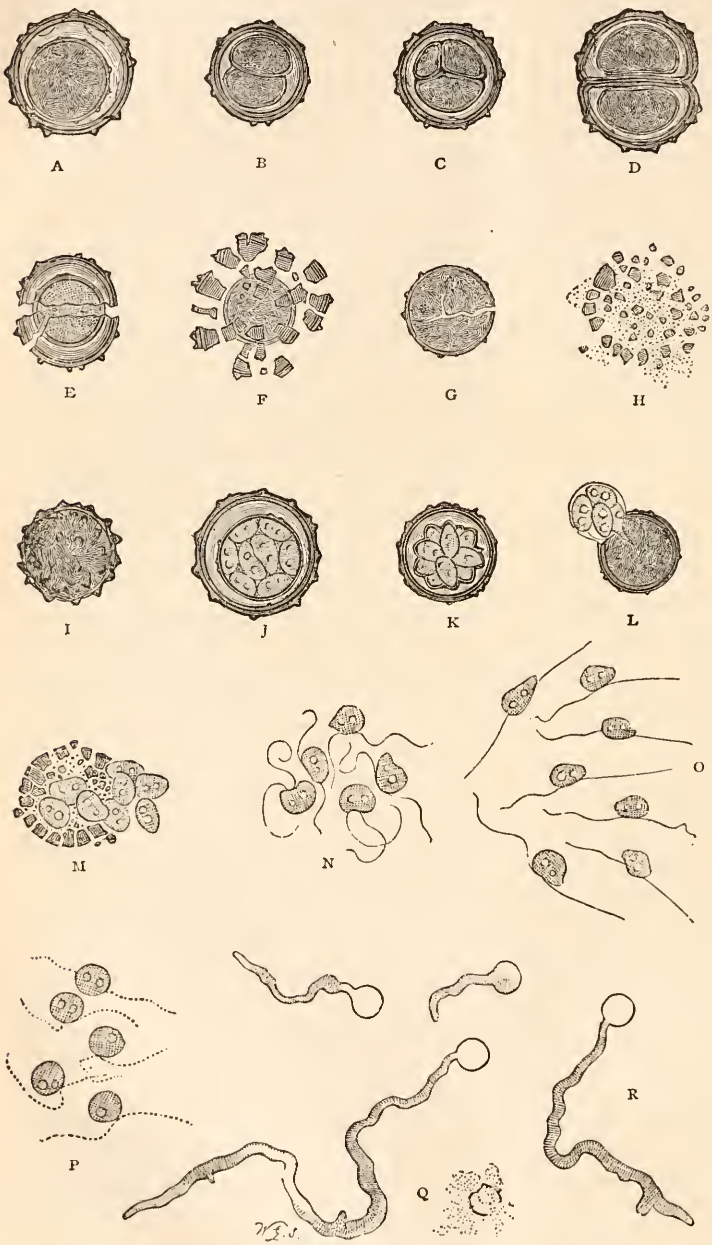

Fig. 113. Various stages in the Development of the Resting Spore of Potato Fungus.

The Rev. J. E. Vize, Forden Vicarage, Welshpool, a gentleman who has made a special study of microscopic fungi, has had some of my living material under examination during the past winter and spring, and when the first signs of germination showed themselves in my oospores, I wrote him to keep a good look-out for results. He wrote me as follows, under date of April 21:—"My idea certainly is that the oospores are germinating: bottle No. 1 had a thin film on it which developed into a lot of mycelium and threads of Peronospora." I, too, observed the same fact in London.

Throughout May the habit of the oospores appeared to remarkably change, for instead of producing zoospores they protruded a thick and generally jointed thread, this thread agreeing exactly in size with average *Peronospora infestans* threads. On May 13th I observed on the preparations treated with expressed juice of horse-dung threads similar to the very long branched thread shown at S, S, S, fig. 114; these threads were so long that they traversed the entire slide, and I could only detect a single septum or joint, and frequently none. T, U, V are characteristic: the latter shows two septa, which is a common condition at this stage of growth; and all three figures show the protoplasm of the oospore coiled up within the walls of the latter. W shows an oospore germinating with the antheridium (A) attached to the oogonium, and still upon its last year's thread; X is a germinating oospore with a thread showing the first septum; and Y shows two germinating oospores emerging from one oogonium, each thread showing the first septum; the old male organ (antheridium) is still attached to W, X, and Y. The figure at Z, drawn on May 12, is characteristic, and shows three septa; the specimen was sent on to the Rev. M. J. Berkeley, who replied: "I found the germinating oospore exactly as you figure it. There can be no doubt about the matter." Mr. Broome, who was examining similar material of his own, wrote on May 4: "It only remains now apparently to see the Peronospora arising from the threads which proceed from the oogonia to prove the identity"; and again on May 20: "I do not see any attached conidia, but the space between the sections of potato is covered with long threads resembling the conidiophorous threads, but I could not see any with the spores on them." It may be said here that no other known fungus has conidiophorous threads similar to those of the Potato fungus.

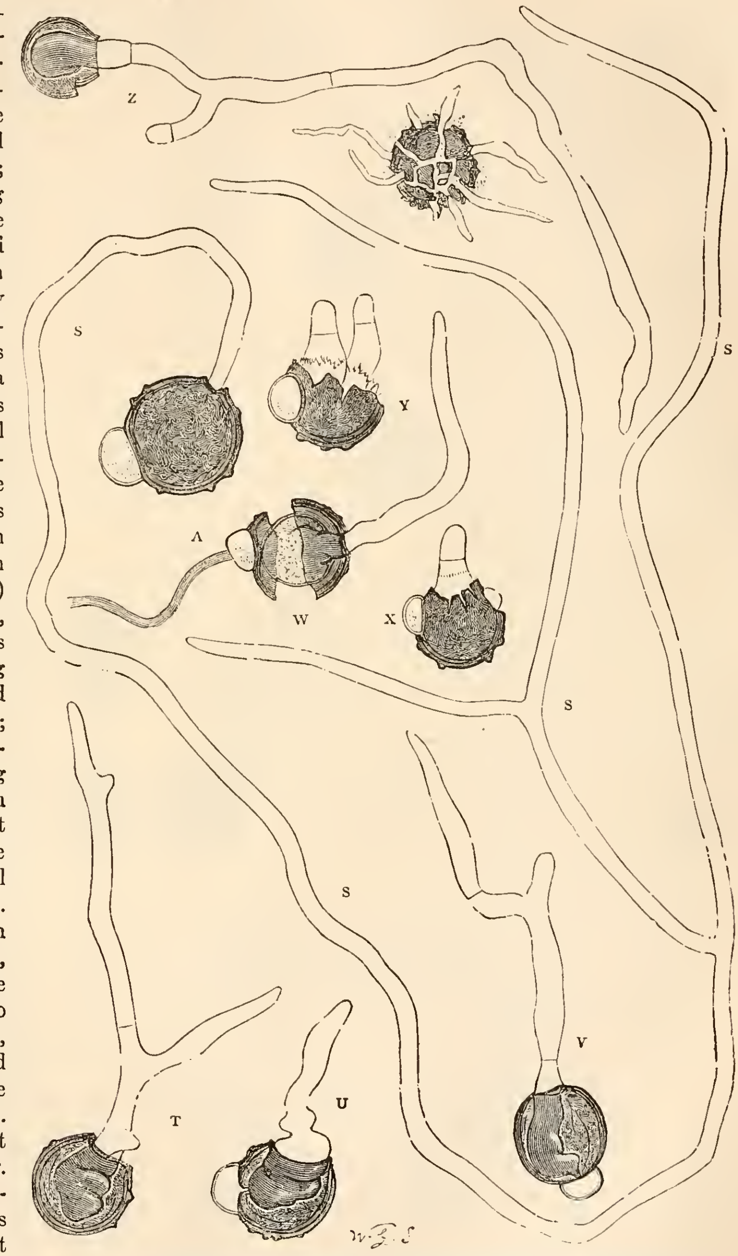

Fig. 114. Development of Resting-spores of Potato Fungus. (For details see text.)

At the beginning of May, whilst observing the habit of Fusisporium and its resting state, I observed typical *Peronospora infestans* growing upon the drier parts of the previous year's crushed and

decayed leaves. This observation was confirmed by Mr. Vize, who wrote on May 22: "According to my examination, the Peronospora grows on the drier parts of the magma. I do not observe it growing on the very wet."

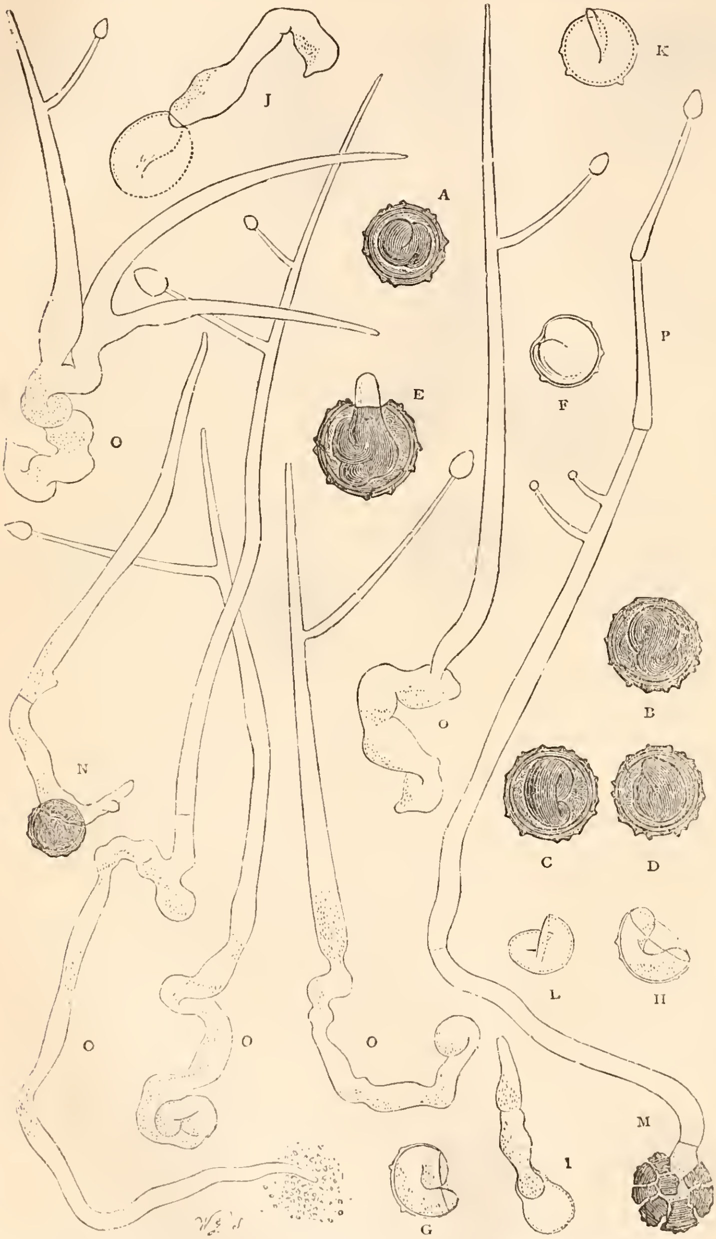

Fig. 115. Resting-spores of Potato Fungus before and after Germination (see text).

On fig. 115 may be seen a collection of resting-spores before and in the act of germination, together with a number of Peronospora threads taken from potato-leaves and tubers previously infected with the oospores. A, B, C, and D show oospores in which the protoplasm which is destined to produce the new plant is coiled up within. At E this coil is seen just emerging. This convolute mass is really contained within a thin bladder, and sometimes the bladder is expelled, as in Cystopus, from the oogonium before the coil unwinds, as at F, G. The thread then emerges as shown at H, I, and J, sometimes leaving the bladder free but broken, as at K, L. It is rare to see the thread of the new plant in connection with the oogonium, as at M, N, though I have so seen it, together with the septa many times. The first mycelium or spawn of the new plant is seen at O, O, O, and from this the Peronospora springs direct, and (when artificially grown) almost invariably in a terminal manner. The conidia are not mature in any of the specimens here figured; doubtless this is because all the plants are more or less abnormal from being grown artificially; but still the threads are characteristic of *Peronospora infestans*, and no known fungus but the one which causes the Potato disease has vesicular swellings such as are shown at P.

Mr. Charles B. Plowright (surgeon, of King's Lynn), a gentleman who has long studied fungi, has patiently examined some of the living material with which I have been working this spring and early summer, and he writes me on May 19 to say: "I find plenty of branching, nodose conidiophores, especially among the drier portions of the substance sent. I also see living conidia. I have seen many conidiophores with convoluted bases, but in the vast majority of cases long ere the conidia come the oospore is gone; I see the granular protoplasm distinctly ascending the base of the conidiophore."

As regards the first coil of mycelium, Mr. Plowright writes: "I distinctly saw this curved in two oospores, and I believe the mycelium comes out with a curl." The same gentleman, under date May 19, writes: "I saw a great many conidiophores both with conidia *in situ* and not; most conidia had fallen off; latterly I saw plenty of convoluted bases." The evidence of identity appears complete, and many of the figures here published, and others not published, have been confirmed by Messrs. Vize and Plowright.

At Q on fig. 116 may be seen Peronospora mycelium with a young plant (Q[1]) growing from amongst the starch of the Potato tuber, the dark background showing the cell-wall corroded by the fungus, and at R a similar fragment of mycelium upon the cuticle of a potato-leaf: it is very common to see one cell of the cuticle thus discoloured by the corrosive mycelium, the corrosion of the cell being caused by the mycelium passing over and upon it. Both threads here shown come direct from last year's resting-spores. At S is engraved a branch of the Potato fungus, showing the numerous partitions with which the threads are at times furnished, and at T is a typical well-grown branch of the fungus, with a full-grown conidium at the apex; this conidium may either discharge zoospores, as at U, or an irregular mass of protoplasm, as at V, from either of which a new plant may spring, and in this habit the conidium agrees well with the resting-spore: the branch in this figure is shown as continuous, and though furnished with the vesicular swellings, no partitions are present; the branches are frequently so seen. At W is illustrated a small weak plant, giving rise to a branch, which branch is developing into a large and strong plant: such a phenomenon is by no means uncommon, and shows how the fungus increases itself in every possible way. I have frequently seen this secondary thread branched.

Fig. 116. Development of Resting-spores of Potato Fungus (see text).

During the last hours of completing this, the last engraving (fig. 116) illustrative of the Potato fungus, a new and curious fact came to light. On examining the oospores in saccharine fluid, I observed some

of the discharged bladders to be carrying from two to four secondary bladders inside (X); these secondary bodies were in their turn expelled, and grew and produced mycelium as at Y, T, Y, whilst a few of the same secondary bladders burst and produced from three to six very small zoospores, generally only three. It is a most singular fact that these secondary bladders and zoospores are exactly the same in size with De Bary's *Pythium vexans*, and about one-sixth or eighth of the bulk of the resting-spores from which they were discharged. With this exception there has not been the slightest approach in any of my material to organisms which might be referred to Pythium. Mr. Plowright writes: "None of my oospores ever burst and produced Pythium or Pythium-like spores."

My material has contained a large number of dead mites and aphides and a few nematoid worms; the oogonia and threads were to be seen in all parts of the dead insects, but not in the worms.

De Bary, in reviewing my observations, says:—"Even if the often-mentioned warty bodies were hybernating oospores of Phytophthora (Peronospora), like the similar oospores of *P. arenariæa*, which resemble them, we should not gain much information bearing upon these questions, since their occurrence is, at the best, extraordinarily rare." This sentence is very erroneous; for although the bodies were apparently rare when I first recorded their discovery, they were not necessarily so in a state of nature; for on continuing the experiments after my first essay was written, the resting-spores were produceed in myriads, and that, too, within the tissues of a comparatively few leaves. During the present spring I have sent mounted preparations of the mature (or almost mature) resting-spores to many of the foremost cryptogamic botanists of Europe, but not one has denied their possible identity with *Peronospora infestans*.

For more than thirty years our Potato crops have been systematically destroyed by two virulent fungi, viz., *Peronospora infestans* and *Fusisporium Solani*. These two parasites almost invariably work in company with each other; they suddenly appear for a few weeks, destroy our crops, and vanish for ten or twelve months, then reappear and repeat the work of destruction. I claim for my work that it is new, and that it has proved how both these fungi hide and sleep through eleven months of the year. As I have kept the resting-spores of both parasites alive artificially in decayed potato-leaves in water, in moist air, and in expressed diluted juice of horse-dung, it conclusively proves to me that the resting-spores hybernate naturally in the same manner. The seat of danger from both parasites is clearly in dung-heaps, ditch sides, and decaying Potato plants.

Any method of destroying the resting-spores of these pests, or of warding off or mitigating their attacks, obviously depends in a great measure upon a full knowledge of their life-history. That life-history I have endeavoured to the best of my ability to watch and describe, and I am content to let the observations stand on their own merits. Sensibly conducted and extensive field experiments might probably teach some valuable lessons; but it is difficult, if not impossible, for any single individual, whether farmer or botanist, to institute and carry out such experiments.

With these notes I am only too glad to bring the whole subject (as far as regards my work upon it) to an end. Any one who feels so disposed, and has the time and patience to go over all the experiments and observations again through another entire year can do so.

MICROSCOPY.

Form-elements in Woody Structures.—M. Moller has recently described some new form-elements in woody substances. In a cross-section of *Avicennia africana*, *e.g.*, he finds bright concentric circular lines, which the microscope shows to consist of regular parallelopipedal stone cells. Spiral thickening he finds in the libriform of *Protea ericoides*, Hort.; so it is not confined exclusively, as Sanio says, to vascular formation. The same naturalist has also described some peculiar arrangement of the parenchymatous elements of *Aquillaria Agallocha*, Reb.

Volvox globator, &c.—In answer to the question in last month's Gossip, whether it is usual for the *Volvox globator* to disappear in a fortnight from its first appearance, I beg to say that it is not. I have found them in a pond in June, and have been able to procure them from the same pond as late as November 13th: this was in 1871. In the same pond, this year, I again found them in June, and they are very numerous at the present time (August 7th). I believe they serve as food for some of the animalculæ. As to the other question, Whether caddis-worms are injurious to Rotifers, &c., I am fully persuaded that they are; and I always carefully exclude them and the various larvæ of gnats and dragon-flies, tadpoles of frogs and toads, &c., from the glasses in which mine are kept for observation; as *Melicerta ringens*, *Floscularia*, &c. Most of the larvæ and tadpoles, &c., have a knack of travelling up the stems of plants, and nibbling everything that may be growing on them; so that if they do not eat them, they certainly injure and destroy them.—*James Fullagar.*

The "Sear" Lamp.—Since the construction of my microscope lamp, illustrations of which appeared in your impression of 1st May last, I have added to

the convenience of the instrument by the adaptation of a steam or water-jacket drying-closet, shown in the annexed illustration, for the purpose of dry-

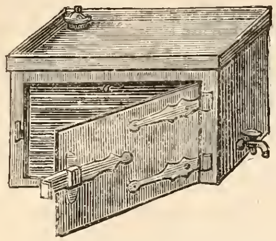

Fig. 117. Drying-closet for Slides.

ing such specimens, sections, spines, &c., as require to be put up dry in balsam, damar, or any of the resinous cements; and by the addition of a portable

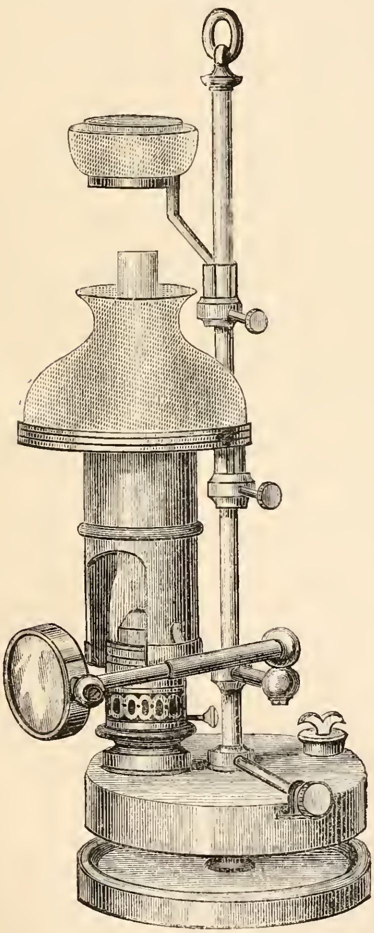

Fig. 118. The "Sear" Microscope Lamp.

rack, which holds twelve slides of the ordinary 3 × 1 size, and which can be slid in and out of the oven or case, facilities are obtained for dispersing air-bubbles, hardening off and finishing slides so mounted at a rate much faster than by the ordinary method of leaving them to dry in a drawer, while the tray-form of the top offers conveniences for keeping gelatinous media, glycerine jelly, Deane's cement, or even old balsam, in a fluid state, and this without any trouble, and with very little attention, on the part of the operator. The water-jacket has a door on each side—one only can be shown in the perspective,—and works, interchangeably with the hemispherical bath, in the ring shown as carrying the latter, its stability being assured by means of a bayonet-joint, rendering the whole perfectly steady and firm. The Silberlight Company, Limited, who are makers of the lamp, will also supply the steam-jacket and rack complete as shown; but I have no pecuniary interest whatever in the invention, which is offered with diffidence to the notice of microscopists as the only lamp that meets all the requirements of the practical working student of the microscope.—*W. Lane Sear.*

ZOOLOGY.

PROVINCIAL SOCIETIES. — We have received part 4 of vol. i. of the "Transactions of the Watford Natural History Society," containing a lecture, by Professor Morris, on "The Physical Structure of the London Basin considered in its relation to the Geology of the neighbourhood of Watford"; a paper by Mr. R. A. Pryor on "The Supposed Chalybeate Spring at Watford, and on the Medicinal Waters in Herts," as well as the rainfall in 1875, and miscellaneous notes and observations.——The East Kent Natural History Society held a *soirée* in St. George's Hall recently, which was very successful, the members contributing in every department of natural history. The President (Mr. Dowker, F.G.S.) and Mr. Saunders, gave elaborate addresses on topics connected with the philosophy of modern research.

PLEUROBRANCHUS MEMBRANACEUS.—In reply to Mr. A. J. R. Sclater's inquiry as to the food of *Pleurobranchus membranaceus*, I think there is no reason to doubt that this mollusk feeds entirely on a vegetable diet. I have had six specimens sent to me from four distinct localities, which I have carefully examined, also taken out the palates and gizzards for microscopic objects, and I therein saw no substance I could term animal tissue in the stomachs, &c., with a $\frac{2}{3}$ objective. Judging from the uniform green appearance of the pulpy mass found in the stomach, I am inclined to conclude it was some kind of fucus. I have not once found in Pleurobranchus any vestige of animal tissue of any kind, even the most indigestible fragment; otherwise I have occasionally found such; say, a palate, or part of a palate, of the animal eaten in the stomach or gizzard

of the animal-eating mollusks; I therefore conclude the Pleurobranch is a vegetarian; yet I should like to join my request to Mr. Sclater's, to see the opinion on this subject, of some one of more extensive experience, if there is still a doubt on the question, in SCIENCE-GOSSIP. I do not care to have extracts from books, but practical experience, and for some reasons I have in reference to this same Pleurobranch,—*e.g.*, I was partly led on to examine this mollusk and extract its palate through reading the interesting book "On Objects for the Microscope," by L. L. Clarke, wherein I read his description of the palate of the Pleurobranch, which so arrested my notice that I became exceedingly interested in it, and, after prolonged effort to obtain one, I was amazed to find the author had described the *gizzard* for the palate; aud, cousequently, the palate really was not noticed. I presume he was misled by a slide mounted by some other person than himself, and then misled his readers through its being wrongly named.—*J. Turner.*

BOTANY.

THE BOTANY AND GEOLOGY OF WEST YORKSHIRE.—Dr. F. A. Lees, and J. W. Davis, F.L.S., are engaged upon a complete description of the Geology, Botany, Physical Geography, &c., of the West Riding of Yorkshire, and the book (which will be a large one, and limited in impressions) will shortly be published.

SYMPHYTUM TUBEROSUM.—This is a common plant in the vicinity of Ediuburgh, and *S. officinale* is also found, but in less abundance. Now I wish to point out what appears to be a mistake about the time when these two plants are in flower. Many of our Floras give May and June as the floweriug season of *S. officinale*, and June and July as that of *tuberosum*. But my own observation of the plants leads me to consider this a mistake. During the present season *S. tuberosum* was in flower from about the middle of May till the middle of June. But *officinale* did not begin to flower till about the middle of June, and continued flowering till August. Perhaps some of the readers of SCIENCE-GOSSIP may have observed which of the species is first iu other localities.—*D. Douglas.*

DIRECTION OF PLANT-GROWTH.—The direction of plant-growth, it is known, is determined both by light and by gravity. The geotropism, or action of gravity exclusive of light, has before been examined; and recently M. Müller, of Thurgau, has endeavoured to study the converse fact of heliotropism, by excluding the influence of gravity as far as possible. He grew his plauts in a cylinder rotating about its horizontal axis. The apparatus was so arranged that the light, coming through an aperture in the shutter of a dark room, fell parallel to the axis; the bendings observed were thus purely heliotropical. Among other results he found that only those zones which were not fully grown out, showed heliotropic bendings; that the most strongly growing parts of the stem were most sensitive to one-sided illumination; that the bending takes some (variable) time to manifest itself and continues some time after removal of the cause; that the rate of bending is at first slow, gradually increases to a maximum, and thereafter diminishes; that the bendiug is greater the intenser the light, &c.

GERMINATION OF SEEDS.—It has recently been proved that several kinds of seeds will germinate between pieces of ice. A full investigation of the lowest limit of temperature at which plants may germiuate has just been made by M. Haberlandt. The experiments were upon wheat, rye, barley, red beet, rape, lucern, poppy, and mauy other seeds. Several hundred seeds were employed of each species, and every fourteen days the seeds were taken out of the ice-chest, whose temperature was kept constant between 0° and 1°, and examined in a space whose temperature was under freezing-point. Iu forty-five days a decided beginning of germination was observable in eight different species. In four months it had continued to progress in a minority of these; the rest had stopped. In fourteeu species there was no germination. M. Haberlandt is of opinion that those seeds which can germinate at a lower temperature than others of the same species, will give plants that require a less amount of heat for their complete development than the others, aud thus by artificial sowing in cold spaces a means is to hand of obtaining species soon ripe and needing little heat. Of all the seeds which had remained for four months in the ice-case, only a few were found capable of development when brought iuto a warmer temperature of 16° C.

MAIANTHEMUM BIFOLIUM, D. C. (*Smilacina bifolia*, Desf.).—Will you give an old reader of SCIENCE-GOSSIP room in your pages to state his claim to the discovery of *Maianthemum* in the only locality where it is really indigenous? I have no doubt the account will be interesting to your readers; but my chief reason for giving it is that the true history of the plant seems but little known, so little indeed that at a late meeting of the Leeds Naturalists' Society a paper was read in which it was stated that Mr. W. C. Backhouse, of York, was the discoverer. Of this I was informed by one of the presidents who knew my connection with the plant. The history of its discovery is as follows:—In June, 1860, I, accompanied by a friend, Mr. F. Reynolds (then living at Ayton, near Scarborough), a field

botanist, was searching for plants through the sides of Forge Valley, near Scarborough, and, winding our way through the most unfrequented parts, I came upon *Maianthemum* spread along the brow of the hill on one side of the valley, growing in peat soil, quite undisturbed, and shaded by oak-trees, nearly a mile from any house or garden, and far from any road. I called my friend to the discovery, and we both took away specimens. I immediately wrote to Mr. Mitten, the botanist, and sent him a specimen of the plant. Mr. Mitten sent the specimen to Mr. Borrer, who was then the patriarch of British botanists, with an account of its discovery. Mr. Borrer immediately communicated the discovery to Dr. Walker Arnott. Dr. Arnott at once wrote to me for particulars. Just at that time the eighth edition of Hooker and Arnott's "British Flora" was passing through the press, and Dr. Arnott delayed the printing-off unti I had satisfied him that the plant I had discovered was truly British. I have before me now a letter dated 5th July, 1860, from Mr. Borrer, in reply to Mr. Mitten's communication, kindly sent me by Mr. Mitten. He writes:—"Thank you for the extremely interesting communication of Mr. Braby's discovery. . . . . I visited the reported place in Northumberland, and found it scarcely outside of a garden, and the plant entirely carried away by curious visitors. The place where I have seen it in Caen-wood is dubious—one large spot near a maze walk in a wood. Perhaps Mr. Braby would prudentially conceal the name of the place where he found his plant; but I should like to know whether it is beyond suspicion of escape from a garden." I have also before me the second letter I received from Dr. Arnott, dated 23rd July, 1860. He writes: "The packet of Maianthemum, and also your letter, reached me safely this forenoon. I have in consequence modified somewhat the observations (in the "British Flora") I have made on the locality, the only one that has any pretensions to be considered genuine. I have said, 'west-side of Forge Valley, near Hackness,' instead of Hackness only, &c." It will be seen that *Maianthemum bifolium* was unknown as an indigenous British plant, until June, 1860, when it was discovered by me, and inserted by Dr. Arnott without any doubtful mark as a genuine British plant in the eighth edition of Hooker and Arnott's "British Flora"; its first appearance in any standard work in that character. I may add that at Dr. Arnott's request I sent him some roots of the plant, which he informed me he had planted in the Botanic Gardens, Glasgow. I have a letter from an acquaintance then living at Scarborough, to this effect: that some considerable time after the plant was discovered, he saw Mr. Backhouse on a visit to the locality. That visit I believe forms the whole of his connection with the discovery of the plant.—*J. Braby.*

Varieties of Colour in Wild Plants.—The following varieties have been noticed by myself at various times on the soils mentioned in each case:—*Varying from Purple to Pink and White:* Campanula rotundifolia, white, Chalk-downs, Worthing, Sussex; Trifolium pratense, white, chalk and gravel, Brighton and St. Alban's (does T. medium ever vary?); Viola canina, pink and white, chalk, Worthing; Viola odorata, pink and white, chalk, gravel, &c., Worthing; Bartsia odontites, one specimen, white, chalk, Worthing; Prunella vulgaris, white, gravel, Cambridge; Erica tetralix, and cinerea, white (I believe from Balcombe, Sussex, sand); Calluna vulgaris, white (also, I believe, from Balcombe, Sussex); Malva sylvestris, one specimen, white, chalk, Steyning, Sussex; Malva moschata, white, gravel and clay, St. Alban's, Herts; Centaurea scabiosa, white, gravel (?), Ingatestone, Essex,—chalk, Worthing; Stachys palustris, white, gravel, St. Alban's,—chalk, Worthing; Stachys arvensis, white, river alluvium, Cambridge; Cardamine pratensis, white, river alluvium, Cambridge; Erythræa Centaurium, Horsham, Sussex (soil?); Hyacinthus nonscriptus, gravel, St. Alban's; Polygala vulgaris, pink and white, chalk, Worthing; Achillea Millefolium, varying from deep pink to white everywhere. *Varying from Yellow or Red to White:* Primula vulgaris, white, chalk, Worthing; Papaver Rhœas, pure white, ballast on railway, Cambridge, one petal nearly entirely white, Brighton, chalk. I have found a double variety of Cardamine pratensis fairly common near Worthing (between Clapham and Finden), also Ranunculus repens, with a double corolla, at Cambridge. I heard my first chiffchaff this year on Sunday, April 2, and swallow April 4, in St. John's College grounds, Cambridge. In 1873 I was staying near Brighton during the autumn, and I used to see a pair of martins every sunny day till December 15. On December 5 I saw a swallow; it was a cold day, and it could scarcely fly at all. I unfortunately did not stay during the spring, so that I could not tell if they hybernated. The year before last a linnet bred in a gentleman's garden at Cambridge, in November. I do not know if they brought off the young birds, but as the weather became very cold soon after I heard of it, I suppose they did not. I have twice found humble bees impaled on thorns near a butcher-bird's nest, both times near Worthing. On one bush there were three or four. Last September I found two S. convolvuli near St. Alban's, and the year before one very bad specimen was brought me also from St. Alban's. I saw Edusa and Hyale also there last autumn. I think I saw a request for a receipt for a cement fit for natural history purposes. Isinglass dissolved in warm vinegar or acetic acid answers very well, and is, I believe, the same as the cement called Coaguline. It needs warming before use.—*A. F. G.*

GEOLOGY.

Carboniferous Land-shells.—Dr. Dawson has described the occurrence of a large number of a carboniferous land-shell (*Pupa vetusta*) in South Loggins, Nova Scotia, inside an erect *Sigillaria* trunk, above two thousand feet above the stratum where this shell was first met with. Two other carboniferous laud-shells, *Pupa vermilionensis* and *Dawsonella Meeki*, have also been found in the coal-field of Illinois.

"Missing Links."—Professor Marsh is now arranging the vast collection of animal remains found in the West, and announces two additional fossil birds possessing teeth implanted in sockets. One is a new species of the first division, *Hesperornis*, and the other forms the type of a new genus, *Lestornis* (*L. crassipes*), the remains of which indicated a large swimming bird, fully six feet in length from the bill to the end of the toes.

"The Metamorphic Rocks surrounding the Land's-End mass of Granite" is the title of a recently-published paper by S. Allport, Esq., F.G.S. The author described the results of a microscopic examination of certain metamorphic rocks surrounding the Land's-End granite, indicating the changes produced by the intrusion of the latter upon clay-slate and upon certain igneous rocks. The slates in contact with granite become converted into tourmaline and mica-schists, and are found to contain crystalline quartz, tourmaline, and three distinct varieties of mica, with occasionally tremolite, magnetite (and andalusite?), and in some localities felspar. Their structure is also changed, the most remarkable changes being foliation with every gradation from nearly straight parallel lines to the most complicated contortions, and concretionary structure by segregation of quartz and mica, the result being a spotted schist. The strata near the granite contain far more quartz than those at a distance; and the author thought that there could be no doubt that much of the quartz has been derived directly from the intruded rock. He referred particularly to the fluid-cavities contained in the quartz of the granite, schorl-rock, and altered slates; and from his observations upon them, stated that he was compelled to dissent from the views of Mr. Sorby, inasmuch as he found no uniformity to prevail in the relative sizes of the bubbles and fluid-cavities in the quartz crystals belonging to precisely the same portion of rock, or even in the same crystals. Hence he regarded it as impossible to arrive at even an approximate estimate of either the temperature or the pressure under which a given rock was formed, from a consideration of such characters. The author next described the characters and mode of occurrence of tourmaline both in the granite and in the schorl-rock, and inferred that at the separation of the latter from the former the whole mass was in a plastic state, and that then the tourmaline and quartz became crystallized in an order varying in accordance with varying conditions. He also noticed the alteration of tourmaline producing pseudomorphs of that mineral; and stated that while all the three varieties of mica found distinctly furnish the red lithium line when treated spectroscopically, this is most strongly marked and persistent in the white variety, which is probably a typical lepidolite. The altered dolerites and basalts described by the author in the remainder of his paper are marked as "Greenstones" on the map of the Geological Survey. They were stated to vary in colour from dark bluish-green to dark brownish-green, and in texture from coarsely crystalline rocks, not fissile in any direction, to fine-grained or compact rocks with an imperfect slaty cleavage. The coarsely crystalline rocks are regarded by the author as altered dolerites, and some, if not all, of the more compact varieties as originating from fine-grained basaltic portions of the same rocks. The author was unable to decide whether these masses are contemporaneous and interbedded or intrusive sheets;—both may be present, but in any case they are older than the granite. He described in some detail the structure of specimens of these altered rocks from many localities, the microscopic examination of which shows that the pyroxenic mineral, whether augite or diallage, has frequently been converted into a hornblendic substance, and that actinolite is found filling cavities and fissures in precisely the same manner as other products of alteration. The imperfect cleavage of the more compact varieties is regarded by the author as in accordance with the facts observed in typical slates. The metamorphism of the dolerites is regarded by him as different in kind from that of the slates, and caused rather by a decomposition and rearrangement of mineral substances *in situ* than by an introduction of new material. In many cases the process of alteration may be followed step by step; and from the evidence it would appear that two rocks of similar origin and composition may follow two different lines of metamorphosis, and thus become converted into two totally different substances; and again many of the metamorphic rocks have undergone a second series of changes, brought about chiefly by chemical forces, and indicated by the occurrence of micaceous and chloritic pseudomorphs after tourmaline and an alteration (hydration) of the mica. With regard to the origin of the granite of Cornwall, the author said that neither observation in the field nor microscopical study lends any support to the notion that it is a metamorphic rock; but, on the contrary, that there is the clearest evidence of former deep-seated volcanic action, in the disturbance and alteration described in his paper, and in the enormous number of granitic and

felsitic dykes intersecting the country for miles. The mode of occurrence of granite in other localities also seems to him to furnish evidence in the same direction.

NOTES AND QUERIES.

The Polecat.—It was with great interest and amusement that I perused the graphically described yet ludicrous account of your correspondent, W. Hambrough, in Science-Gossip, of an encounter with that pugnacious little animal the Polecat. I can corroborate his statement with regard to the ferocity, irritability, and daring disposition of its nature. In fact, it was lucky for his person that he thought discretion the better part of valour, and made at once a precipitate retreat, although it was on the site where ancient deeds of valour were performed, or else he would have had as tough a fight as ever Roman and Briton had in mortal combat. I was once staying at a house where they kept a polecat (the last animal I should like to own). What with the obnoxious odours that issued from its place of confinement, and its rancorous inclination, it was a task of considerable difficulty to approach within a respectable distance of the animal, and still more so to feed it, at which time it would stick up its back in a curved position, making its fur almost stand on end, at the same time hissing and spitting in a most terrific manner; and I often noticed, instead of taking the food at once, it would make a desperate snap at the leg or arm of the person who fed it. After fruitless attempts to try and tame this wretched beast, the owner was going to give it away, when one day it made its escape and was never seen after. I also remember being told some years ago by a scientific gentleman, whom I happened to know at the time, of a labourer being attacked by a polecat, which in this case jumped upon his chest and clung there, damaging his neck considerably, with the dogged obstinacy of a bull-dog. He was not able to extricate himself, till, with a well-aimed blow of his stick, he felled the contumacious beast to the earth.—*C. P. Hall, Woolwich.*

The Newt.—There seems to be a little uncertainty in the minds of some of the contributors to Science-Gossip with regard to the manner in which the Newt lays her eggs. I can confirm "G. S.'s" statement that they are laid singly. I have reared large numbers of this amphibian from the ova, and they have been invariably laid separately on the leaves of *Anacharis alsinastrum*, the leaf being folded round the egg to protect it, I should imagine, from the sharp eyes of a hungry fish. At the present time I have in the garden several females of the Smooth Newt, who have, for the last two years and a half, roamed about a fernery there, resolutely declining to remain with their relatives in the aquarium, although it is well stocked, I having for several years adopted the plan (recommended by "G. S." in your last) of never changing the water. I should like to know if any of your readers have experienced the same repugnance to an aquatic life in this reptile. So far as my observation has extended, the habit is confined to the female; and in those individuals that have pursued a terrestrial life for some time the skin has a soft velvety appearance. Have any of your readers observed any tendency to cannibalism in the Newts? Of those born in my aquarium a large number were from time to time divested of their caudal appendages by their adult kindred, and this, in most cases, resulted in death.—*E. Step, Southwark.*

Notes on the Aquarium.—"G. S." wishes me to tell him whether I change the water in my aquarium, and says that "most probably this very change of water is one of the primary causes of fatality" amongst fish and tadpoles. In answer to this I can confidently state that the water had not been changed since the aquarium was filled in February, 1876. I certainly did occasionally take about one quart of water out and replace it with fresh, but I did this more for the purpose of getting the dust off the surface of the water than for anything else. I have never had any rock-work in my aquarium, and I shall be glad if "G. S." will tell me how I ought to arrange it, as I intend to put some in. The statement which I made in reference to the appearance of frog spawn a week earlier than usual last year, was made upon the authority of an acquaintance of mine, who saw some in a pond while out botanizing on the 2nd or 3rd of April, 1876, I am not quite sure which of the two days it was. I have not read "The Common Frog" through, but, from what I did read during the short time I had it in my possession, I can confidently recommend it to all who take an interest in the study of our British reptiles, and to young students especially.—*H. C. C. M.*

Variety of the House Sparrow.—The following extract from Mr. Cordeaux's "Birds of the Humber District" (Van Voorst) will be of interest to "C. H." and other readers of Science-Gossip:—"Mr. Boulton, in *Zoologist* for 1865, page 9531, speaks of a breed of black sparrows at Leven, in Holderness, the males deep blackish brown, so black as to be only distinguished from that colour when in hand; the females are a shade lighter, young covered with slaty-black down. White and party-coloured varieties also occasionally occur. A common form is with more or less of the primaries white."—*W. G. B. P., Hull.*

The Clouded Yellow Butterfly (*Colias Edusa*).—This elegant butterfly seems certainly to be becoming commoner than formerly in the South of England, an agreeable exception to what is generally prevalent amongst British butterflies, the rarer species of which have undergone a sad reduction these late years. In many fields about North Kent it was pretty plentiful this summer, occasionally appearing in company with the scarcer *C. Hyale.* I do not know that there is now an increased production of clover, else that might account for the butterfly's thriving. Some specimens I saw on the wing by a roadside on the last day of September flew so languidly that I caught two with my fingers, their demeanour being strangely in contrast with the usual celerity of the species. It has been much debated whether *C. Edusa* hybernates or dies off ere the winter sets in. The dilapidated appearance, however, of late individuals rather suggests that they had not vitality to carry them on to another season. —*J. R. S. C.*

Enormous Puff-balls.—Although the puff-ball I described in the December number of Science-Gossip seemed to me very large, I have since read a description of some puff-balls of such a size that in comparison with them my specimen was almost insignificant. The description of them may be found in the *Zoologist* for October, 1875, communicated by John Sclater, Castle Eden, Durham. He says that

he found nineteen of these puff-balls in a field bordering the Dene, and that by bringing home one of medium size he found the average size would be—circumference, 3 ft. 6 in.; height, 7½ in.; weight, 5 pounds. These would thus be six times as large as mine. The editor of the *Zoologist*, Mr. E. Newman, appends a note saying that *Lycoperdon giganteum* has been found measuring 49 inches in circumference, which is yet 7 inches more than these. I am much obliged to Martin Gardiner for giving me the right name of this species, *L. bovista*, or *L. giganteum*. I can readily believe that it would make a most palatable dish, for its smell is as fresh and inviting as that of the nicest mushroom; and not only in smell is it attractive, but also in appearance, the interior being of the purest white imaginable. My specimen was not of the shape of an inverted cone, as described by Badham, but was an imperfect prolate spheroid, like a vegetable marrow, larger at one end than at the other, with a footstalk at the side, not at the end; and, from the dimensions given by Mr. Sclater, I should judge that his were somewhat similar.—*Frank J. Allen, Shepton Mallet.*

Aquilegia.—"R. W." appears to me to be mistaken when saying that "the latter half of the word is left out altogether," in the derivation of *aquilegia* from *aquila*, for I find the following in Dr. Thornton's "British Flora":—"*Aquilegia*, from *aquila*, an eagle, and *lego*, to collect—a nest of eagles." And he also says: "Or from the talons bent in, as with birds of prey," the idea of resemblance to a bird being evidently the prevailing one.—*J. B. Bradley.*

Query about Gold-fish.—Can and will any of your numerous correspondents tell me the reason of the following fact? Last November I bought some small gold-fish for a tank wherein I have some Valisneria growing. Nothing could have gone on better till about last February, when I remarked that their tails and fins were getting ragged, and now they are gradually becoming "small by degrees and beautifully less." The water is above suspicion as to purity, the shingle and sand at bottom perfectly sweet, but the fish are lethargic and keep to the top of the water. A tench and two minnows in the tank do not suffer from the above ailment.—*Windsor Hambrough.*

Birds' Eggs.—As an egg-collector, I wish to make a few observations on the egg which has puzzled "E. B. T." When an egg is found away from a nest, as in the manner described, it is sometimes difficult to correctly name it, as all birds' eggs vary in size, shape, and markings. From the description, I should imagine the egg to be that of the Song-thrush, *Turdus musicus*. I have had song-thrushes' eggs exactly the same as that described by "E. B. T." They are slightly smaller than the average of thrushes' eggs, nearly round, and of a "uniform greenish-blue colour," entirely destitute of spots. There were four eggs in the nest, all the same size and colour. If your correspondent will again refer to Morris's "British Birds' Eggs," he will find this variety of the Thrush's egg described. I have often noticed great variations in the size, shape, and markings of the eggs of the Song-thrush. In my collection I have about twenty thrush eggs from districts widely apart,—Kent, Scotland, and North-east Lancashire. Not two of these eggs are alike in size, shape, or markings. Some are profusely blotched in black spots, especially at the thick end; others are more sparely dotted, while the two referred to are entirely devoid of spots. "E. B. T.'s" eggs could scarcely have been those of the American yellow-billed cuckoo, a bird, so far as I am aware, never yet observed in this country. Solitary eggs found apart from the nest speedily become weathered. Some time ago I picked up a starling's egg in a field; the egg, though perfectly fresh, was a pure dead white, and for some time I was rather puzzled as to what it really was. This season I found a very large blackbird's egg amongst the grass in a wood. It was a remarkably large specimen; but how it got there it is difficult to surmise. In this locality, nearly 1,000 feet above the level of the sea, the eggs of the birds which breed here are generally of a much darker colour than those of their kind in low-lying and more sheltered localities. This I attribute to climatic influences and to the kind of food. This season I found a blackbird's nest high up on the moors in a heather bush: the eggs were as nearly black as possible. At first I thought the nest was that of the Ring-ouzel (*Turdus torquatus*), which breeds plentifully in the neighbourhood; but on a second visit I saw the hen blackbird go off the nest. If the nest of the ring-ouzel and that of the blackbird were placed side by side, and the eggs removed, it would puzzle an experienced ornithologist to determine "which was which." From "E. B. T.'s" description I feel certain his egg is that of the common Song-thrush.—*S. H. Kerr, Bacup, Lancashire.*

The Cuckoo's Eggs.—In answer to Mr. J. G. Henderson's query (Science-Gossip for July 1st, p. 167), the following may show that the Cuckoo does not hatch her own eggs. Mr. Taylor says ("Half-hours in the Green Lanes"): "We know it builds no nest of its own, but drops its eggs in that of other birds, Nature appearing to have endowed every hen cuckoo with the power of laying eggs similar in colour to those of the species in whose nest she lays, in order that they may not be detected by the foster-parents." Gilbert White says: "M. Herissant, a French anatomist, seems persuaded that he has discovered the reason why cuckoos do not hatch their own eggs. The impediment, he supposes, arises from the internal structure of their parts, which incapacitates them for incubation. According to this gentleman, the crop, or craw, of a cuckoo does not lie before the sternum at the bottom of the neck, as in the Gallinæ, Columbæ, &c., but immediately behind it, on and over the bowels, so as to make a large protuberance in the belly.* Induced by this assertion, we procured a cuckoo, and, cutting open the breastbone, and exposing the intestines to sight, found the crop lying as mentioned above. This stomach was large and round, and stuffed hard, like a pincushion, with food, which, upon nice examination, we found to consist of various insects, such as small scarabs, spiders, and dragon-flies, the last of which we have seen cuckoos catching on the wing as they were just emerging out of the aurelia state. Among this farrago also were to be seen maggots and many seeds, which belonged either to gooseberries, currants, cranberries, or some such fruit; so that these birds apparently subsist on insects and fruit; nor was there the least appearance of bones, feathers, or fur to support the idle notion of their being birds of prey. It must be allowed, as this anatomist observes, that the crop, placed just upon the bowels, must, especially when full, be in a very

* "Histoire de l'Académie Royale," 1752.

uneasy situation during the business of incubation. Yet the test will be to examine whether birds that are actually known to sit for certain are not formed in a similar manner."—*W. G. B. Page, Hull.*

THE CUCKOO.—I read with interest Mr. J. L. Copeman's notes on the habits of the Cuckoo, and think that, on the whole, his arguments are correct. I was always an enthusiastic collector of eggs, and it was my good fortune to find several cuckoo's eggs, uniform in colour and size, conveying to my mind a certain resemblance to the egg of the house-sparrow. I believe it is an open question how the egg is deposited in the nest. Mr. Copeman uses the word "lay" in the common acceptation of the term; but I think this does not invariably hold good, as a friend of mine, an experienced naturalist, informs me that he has found a cuckoo's egg in a nest so placed that the egg could not have got there otherwise than through the medium of the bird's bill. I myself believe that this is the general method which the Cuckoo adopts for placing her egg in the nests of other birds. It would be inconsistent to suppose that she "dropped" them in, as Mr. Taylor asserts, as in this way they would stand a chance of being fractured through collision with the other eggs in the nest; and besides, the small size of some of the nests does not admit of her placing herself in the ordinary attitude of incubation. To conclude, I may state that all are agreed about the parasitic habits of the Cuculidæ; that the volition of the Cuckoo with regard to the variation of its eggs is questionable; that in a great majority of cases it lays its eggs in some suitable spot, and then conveys them to a nest previously fixed upon. I think that these observations will meet with the approval of most of your readers; but if any of them have any suggestions to offer, I should be most happy to receive them.—*Frank Richardson, Rhayader.*

Re CUCKOO'S EGGS.—The Cuckoo invariably lays one egg, and that of a shape and coloration sufficiently characteristic to render its recognition easy to those previously acquainted with it. More young cuckoos are, probably, hatched by the hedge-sparrow than by all the other birds together. I have watched the Cuckoo's proceedings dozens of times in an orchard in Staffordshire, and had as many as three young cuckoos to visit at one time. I always succeeded in making them very tame, and they never wandered far away until their final migration. The foster-mother manifested considerable mistrust in her attempts to satisfy the demands of her usurper's capacious throat; and appeared to observe precautions, lest she should be swallowed herself. I have no doubt the Cuckoo's egg varies a little in coloration, but do not believe in the existence of any special provision for voluntary pigmentation in the act of extrusion, as suggested by Mr. Taylor. The usual custom of the Cuckoo is to suck the eggs existing in the nest, and then to deposit therein one of her own, to which may subsequently be added one or more of the proper proprietors. After the hatching is completed, the young monster soon effects the destruction of his puny associates by appropriating the lion's share of the food—by trampling them to death—or by ousting them bodily; and so remains sole possessor of a home, which he quickly outgrows, and tyrannically maintains.—*E. Holland, M.D.*

NETTLE BEER.—It may not be generally known to your readers that the ironworkers, puddlers, and colliers of Monmouthshire drink a quantity of the above-named beverage; in fact, it is so common to them, that every woman is supposed to know how to make nettle beer as readily as she makes tea. The men say they can work better on it than malt liquors, and the women put faith in it as being "good for the blood." I cannot express any therapeutical opinion on it; I can only say that it is very pleasant to drink, and I should think, if carefully made, it would be better to "work on" than public-house beer. This is the formula given to me by a housewife who makes two gallons weekly:—Boil in two gallons of water a few handfuls of nettles, ditto of dandelion, about a handful of wood sage, two ounces of bruised ginger, and a few handfuls of hairough, or what is called in some parts cleavers; these should be boiled together for about half an hour, strained, and worked by placing some toasted bread into it with a little yeast on. This operation being over, one ounce of cream of tartar is added to the whole, which should be bottled, tightly corked, and laid upon its side, and after a few days will be ready for use.—*S. B. Mason.*

CLOTHES MOTHS.—If William Bean will put a bit or two of common dip candle, rolled in paper, with his woollen tie, he will see no more moths. This has been thoroughly tested.—*M. A. L.*

SAGACITY OF BIRDS.—During this dry summer, thrushes and other birds seem to have a difficulty in securing the kind of food required, partly because worms seldom are seen at the surface of the ground in very dry weather. This morning, on my lawn, I found thrushes had been busy at work, at the two back feet of an iron seat; where during the night they had carried a number of snails, chiefly large, and broken their shells against the iron-work, to the extent of at least thirty-two, which I counted from the *larger* fragments strewing the grass. They had evidently been holding high feast there, from the manner in which the grass was padded, and smeared with the slimy secretion of the snails.—*Horace Pearce, F.G.S.*

FATAL BITE OF AN ADDER.—Can the following paragraph, which has been going the round of the papers, be verified?—"On Thursday afternoon, a young man named George Thompson, who was on a walking tour with a friend through Surrey and Sussex, was ascending the celebrated elevation of Leith Hill, when he accidentally trod upon a black adder. Thompson, who was wearing knickerbockers, was bitten by the reptile in the calf of the leg. Apprehending no danger, he continued his ascent, and had reached a small village on the other side, when he was taken ill. He was assisted to the inn, and a medical man was sent for. The virus from the bite, however, had so impregnated his system that, despite every attention, he died on Saturday." —*T. P. B.*

DO SPIDERS MAKE A NOISE?—Yes; the one I saw and heard was black and hairy, the body about the size of a sweet pea, legs short; it was hanging head downwards half an inch, and vibrated, but I could not see how the *tick* or *chick* was produced.—*F. S.*

YELLOW BUNTING.—In addition to Cumberland and Northumberland (referred to in last month's SCIENCE-GOSSIP under "Local Names of Plants"), the Yellowhammer is known amongst boys, both in Berwick and Roxburghshire, as the Yellow-yorlin. It is also sometimes called the Yite and Yellow-yite in these counties.—*A. B., Kelso.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

E. Lovett.—Many thanks for the slide.

E. W. A.—Either some joke or some mistake has been perpetrated, for the flowers, "all from this neighbourhood," consisted of wheat, oats, roses, geraniums, and maiden-hair ferns!

H. A. S.—The "minute black spots" on the chalk surrounding flints are filmy deposits of oxide of manganese.

James W. R. (Manchester).—Get Lankester's "Half-Hours with the Microscope," with chapter on Polarization by F. Kitton.

S. A. B.—The galls on the hawthorn are produced by the puncturing of the bark by a species of *Cynips*.

H. R. M.—Smee's "My Garden"; Burbidge's "Domestic Floriculture"; and Hensley's "Hand-book of Trees, Shrubs, and Herbaceous Plants," will, any of them, give you the information you seek.

A. B.—Thanks for the interesting specimen of a monstrosity in *Medicago*.

G. R. Vine.—The specimens of macrospores of *Lepidodendron* are thankfully accepted, as would be any other similar objects. We never heard of their being found under such conditions before. Send us a short account of them.

M. Mudie.—Your fungi arrived in such a state of decomposition that it was impossible to identify them. A new edition of Cooke's "British Fungi," with coloured plates, will shortly be published by Hardwicke & Bogue, 192, Piccadilly.

Enquirer.—We are not aware of the existence of any special scientific book club. The best work is Nicholson's "Manual of Palæontology," published by Blackwood.

R. Booty.—The specimens are: 1. *Cardium echinatum*; 2. *Pecten dubius*; 3. *Hydrobia*; 4. *Cyprea Europeu*; and, 5. a species of *Bulla*.

Permian.—Among the best books on Geology are Lyell's "Student's Manual"; Geikie's edition of Juke's "Manual"; Green's "Manual" (1st vol. on Physical Geology only); and Tate's edition of Portlock's "Manual." The best work on Palæontology is Prof. Nicholson's "Manual." The only special work on the Permian formation is in German, by Prof. Geinitz, on the "Dyas." The book by Lyell you mention is so largely added to in the later editions, that it is hardly worth while putting it in the hands of a student who wants to gain time.

H. M. C. A.—The plant will be named in our next issue.

W. A. C.—Your fern is a young specimen of *Polystichum lonchitis*.

M. F.—The specimens are: *Corallina officinalis* (a sea-weed which secretes lime, and is usually of a pinky-white colour), and a dried specimen of a zoophyte (*Tubularia indivisa*).

J. J. V.—The flower is that of the Soap-wort (*Saponaria officinalis*).

EXCHANGES.

15*a*, 512, 776, 990, 1,101, 1,226, 1,287, 1,445, 1,513, 1,566, *Medicago lappacea*, *Veronica peregrina*, *Euphorbia dulcis*, *Poa sudetica*, &c., offered for 14*d*, 32, 101, 106, 119, 194, 241, 255, 471, 474, 500, 564, 598, 631, 698, 720, 721, 828, 85?, 1,060, 1,089, 1,105, 1,137, 1,305, 1,451, 1,453, 1,513, 1,553, 1,554, "L. C.," 7th ed. Also Lowland for Alpine Willows.—A. Brotherston, Shedden-Park-road, Kelso, N.B.

Silene nutans in exchange for *Melilotus arvensis* or other plants.—G. C. Druce, Northampton.

Two good Slides of named Foraminifera for each fair specimen of Salicornaria, Retepora, Cellularia, and Lepralia; and Foraminifera for Fossil Polyzoa or Brachiopoda.—G. R.V., Hill Top, Attercliffe, near Sheffield.

Vegetable Sections, double stained, showing vascular tissue in red, and cellular tissue in blue, in exchange for other well-mounted Slides.—W. G. C., 103, Warren-avenue, Boston, U.S.A.

Wanted.—Rubbings of Monumental Brasses in exchange for Fossils from Chalk, Seaweeds, Ferns, &c., or Rubbings from this district.—Address, Frederick Stanley, 6, Clifton-gardens, Cliftonville, Margate, Kent.

Offered.—191, 669*b*, 757*c*, 1,121, 1,494, 1,506, &c., "Lon. Cat.," 7th ed., for other Plants.—D. Douglas, 13, McNeil Hall, Leith-walk, Leith.

Wood Sections, Soundings, Zoophytes, Diatoms, and Ferns, given in exchange for other Unmounted Material.—A., Rugham Farm, Rotherfield, Sussex.

Devon Algæ, mounted and named, for Northern Specimens.—P., 3, Fern Cottages, Torquay.

Duplicates.—*Paphia*, *Adippe*, *Selene*, *Euphrosyne*, *Artemis*, *Lucina*, *Sibylla*, *Galathea*, *Corydon*, *Alsus*, *Humuli*, and *Lupulinus*.—R. J. Stent, 70, Queen-street, Portsea, Hants.

Eggs for Exchange, blown with one hole—Oyster-catcher, Tern, Dunlin, Dipper, Redshank, Red Grouse, Golden Plover, Ring Plover, Curlew, &c. Wanted: Owls, Nightjar, Kingfisher, Heron, &c. Unaccepted offers not answered.—J. Lancaster, 24, Prince's-street, Carlisle.

Pupæ of *Jacobeæ*; Imagos of *Adippe*, *Euphrosyne*, *Selene*, *Polychloros*, *L. dispar*, &c.: also a few Larvæ of *Bombyx Cynthia*; offered for *Sinapis*, *Edusa*, *Betulæ*, *Aglaia*, *Cardui*, *Blandina*, &c., or other silk-producing species.—R. Laddiman, 3, Cossey-terrace, Upper Hellesdon, Norwich.

Free distribution, upon receipt of small box and return postage. I shall be glad to send to any conchologist specimens of *Zonites glaber* and *C. rugosa*, var. *dubia*, from the neighbourhood of Malham, Yorkshire. — Lister Peace, Hebble-terrace, Bradford-road, Huddersfield.

Unmounted Microscopic Material wanted in exchange for British and Foreign Zoophytes. Write first. No ferns wanted.—E. C. J., 46, Gensing-road, St. Leonard's-on-Sea.

A rich and interesting Diatomaceous Deposit (mounted) to exchange for any good Slide illustrating Marine Life,—Echinodermata or Crustacea preferred.—Ed. Lovett, Holly Mount, Croydon.

Nos. 115*b*, 121, 122, 127, 140, 533, 542, 724, 912, 1,041, 1,198, 1,441*b*, 1,478, 1,506, "Lon. Cat.," offered for Nos. 74, 184, 312, 334, 348, 353, 377. 598, 855, 1,133, 1,248.—G. Horn, 57, Bell-street, Calton, Glasgow.

Wanted.—Slides of *Stauroneis spicula* and *Schizonema cruciger*, in exchange for well mounted Slides of Diatoms from Subpeat, Troy, New Hampshire, U.S.A.—John Bramhall, St. John's Vicarage, King's Lynn.

Saponaria officinalis, var. *puberula*, Syme, and *Catabræa aquatica*, var. *littoralis*, Parn., in exchange for other good Plants.—John Wm. Burton, 35, Hemans-street, Liverpool.

Goodyera repens, given in exchange for any of the following: *Ophrys apifera*, *O. arachnites*, *O. aranifera*, *O. muscifera*, *O. spiralis*.—Miss H. Joss, Invergordon, N.B.

BOOKS, &c., RECEIVED.

"The Crimea and Transcaucasia." 2 vols. By J. B. Telfer, R.N. London: H. S. King & Co.

"Annual Record of Science and Industry." 1876. London: Trübner.

"Rambles of a Naturalist." By J. H. Gurney, jun. London: Jarrold & Sons.

"Carpenter's Mental Physiology." 4th Edition. London: H. S. King & Co.

"Weather Charts and Storm Warnings." By R. H. Scott, F.R.S. London: H. S. King & Co.

"Monthly Microscopical Journal." August.

"American Naturalist." July.

"Boston Journal of Chemistry." July.

"Potter's American Monthly." July.

"Canadian Entomologist." July.

"Les Mondes." July.

"Land and Water." August.

"The Argonaut." August.

"Chemical News." August.

"Journal of Education." August.

"Annual Report of Entomological Society of Ontario."

&c. &c. &c.

Communications Received up to 9th ult. from:—G. H. K.—F. K.—G. W. jun.—S. W. U.—E. E.—H. E. W.—A. P.—T. W. D.—Dr. P. Q. K.—M. A. B.—F. H. A.—H. J.—R. R. T.—G. P.—J. A. jun.—W. H.—G. E. B.—M. A. T—F. C.—J. H. G.—R. D.—H. I. T.—S. C.—Dr. G. D. B.—H. H. C.—W. G. B. P.—S. B. M.—C. B. P.—J. F.—J. B.—Dr. E. T. N.—T. P. B.—M. M.—R. J. S.—H. C. D.—H. R. M.—W. W.—J. L.—J. T.—H. E. W.—G. E. L.—S. D. T.—H. C.—H. M. C. A.—H. P.—Dr. F. G. C. D.—J. T. A.—W. G. C.—J. J.V.—Dr. E. H.—G. L.—G. D.—F. S.—D. D.—A. H. B.—W. L. S.—Dr. J. S. W.—M. F.—F. J. R.—M. A. L.—J. G. H.—G. C. R.—W. A. C.—S. P.—Dr. F. A. L.—E. W. B.—L. P.—E. C. J.—F. L. C. R.—A. B.—G. V. R.—T. W.—J. B.—S. B.—S. A. B.—S. A. J.—F. J. R.—J. T. A.—A. H. B.—E. W. A—J. V. L.—H. A. S.—T. W. T.—J. B.—H. E. W.—D. E. J.—J. W. B.—D. B.—H. J.—M. G. C. H.—&c., &c.

HOW TO DISCRIMINATE BETWEEN EDIBLE AND POISONOUS FUNGI.

By C. B. PLOWRIGHT.

THE glorious autumn is fast approaching, with its loaded orchards, its well-filled barns, its cool, refreshing days, and its rich, mellow twilights. What a change from the overpowering sultriness and dust of July and August! With autumn comes the great mass of mushrooms and toadstools,—good, bad, and indifferent; of all colours, shapes, and sizes; which, to the οἱ πολλοι, represent the whole mycologic kingdom. Our country, as being highly favoured for the fungologist, has long been known; but, during the last few years, many and rich additions have been made to its flora, especially by Scotch botanists. For some considerable time past, attempts have been made to introduce and popularize the Continental fungus-eating customs; but, up to the present, these attempts have not been crowned with any special degree of success. In spite of our preconceived notions of French cooks and Parisian *cuisine*, it must be admitted much comes to table, and is eaten with considerable gusto abroad, that our less highly educated tastes reject as unpalatable. This is equally true of fungus-eating. A friend of ours, a keen naturalist, frequently resides for some months in the year in the South of France, and although he enjoys French fare as well as most people, he speaks of the cooked fungi as being insipid to a degree. The method of procedure with these articles of diet seems to be that the fresh fungi, when gathered, are cut into small pieces and dried in the sun, and are preserved for winter use. Before being cooked, they undergo a series of continued washings in water, until literally all the remaining flavour is washed out of them. By this process it is extremely probable many species are rendered not only innoxious, but perfectly wholesome, which would otherwise produce most serious, if not fatal symptoms; and from being useless waste products, become material for the formation of unexceptional protoplasm. Many analyses of fungi have been published, but a real knowledge of their chemistry remains a desideratum: their ultimate composition has been more or less worked at; but our knowledge of their proximate constituents is very meagre. We learn from Dr. Badham, that in Rome the common mushroom is classed with poisonous fungi, and not allowed to be sold in the public market. It is highly improbable this would have been the case without there being some good and substantial reason for it, for Italy is a country where numerous species of fungi are largely consumed, and no fear of these plants as a class exists. It would seem as if there were something special in the climate of the districts from which the Roman market is supplied that renders the mushrooms grown in it poisonous. We know how powerful is the influence of surrounding circumstances upon flowering plants. For example, the exclusion of light from potato tubers or celery plants considerably modifies their properties. Every now and then we hear of people being poisoned (not necessarily fatally) in this country by eating mushrooms, and, when this happens, it is almost always attributed to the wrong kind having been gathered, and not to the nature of the plant being modified by special circumstances. Upon more than one occasion such cases have come under my notice personally, in which people who knew what was a mushroom and what was not, have been made seriously ill by their repast. What the precise difference in the composition of the plant is,

which causes the unpleasant effects, is at present unknown, and is one of those points which have to be worked out. As a rule, however, the wholesomeness of the mushroom is well-nigh cosmopolitan. Several years ago the late Mr. Thomas Baines, who had travelled much in Australia and Africa, told me mushrooms were always eaten when found in his expeditions. Popular credence points to the unwholesomeness of those specimens grown under trees or in woods, but this is in no way substantiated by my experience. The possibility of distinguishing an edible from a poisonous fungus by bruising with a piece of gold or silver, has been repeated time after time in all kinds of books, so that it is no way surprising that a correspondent should ask, in a recent number of SCIENCE-GOSSIP, whether there be any truth in it or not. Many an excellent mushroom has been rejected by the credulous housewife because, when rubbed with salt and a silver spoon, it has turned yellow! The vast majority of mushrooms grown in my district, upon the salt marshes and elsewhere, turn most distinctly yellow when cut or bruised; but this is simply because they are specimens of *Agaricus arvensis*, Shœff., the horse-mushroom, and not *A. campestris*, Linn. Fries, in his "Hymenomycetes Europæi," p. 279, says of *A. arvensis*, "caro alba, immutabilis"; but Mr. Berkeley, in the "English Flora," says it may be known from *A. campestris* by its almost white gills when young, and yellow stains when bruised. Most British fungologists regard this change of colour as one of its specific characteristics; and thus it is really a proof of the wholesomeness of the fungus. At the present moment we do not remember any fungus which changes colour in at all a similar manner; in fact, excepting one or two of the Lactarii, this particular change is a very uncommon one. *Agaricus arvensis*, the so-called horse-mushroom, is by far the most generally eaten fungus in this country: it occurs far more commonly, is much more abundant, and attains a considerably larger size than *A. campestris*, the so-called true mushroom. They are equally nice in flavour, and equally wholesome.

In several books certain general rules are given for ascertaining offhand whether a fungus may be eaten or not: they are so absurd, however, that botanists simply smile and never think of refuting them. Who originally drew up this code I do not know; but subsequent writers have copied it more or less implicitly. It is not exactly easy to see whether these rules are intended for the discrimination of the mushroom from other fungi, or edible from poisonous species generally. Perhaps the most important of these canons is, that edible species never change colour when cut or bruised. We have seen how *A. arvensis* comports itself under such conditions! But there is a variety of *A. campestris* (var. *rufescens*, Berk.) which becomes brilliantly pink at the seat of injury; and this plant is one of the most savoury forms of the mushroom we know. *A. rubescens*, P., assumes, as its name implies, a rufous tint, especially where it has been injured by insects. *Lactarius deliciosus*, Fr., turns from bright orange to a dirty green, and this alone is sufficient to distinguish it from all its compeers. The mere fact of a fungus changing colour to blue cannot be regarded as an absolute proof of its toxic qualities, for a friend of ours has eaten *Boletus chrysenteron*, Fr., before he knew accurately *B. edulis*, Bull.; and during my noviciate I several times partook of *B. badius*, Fr., without any ill effects whatever accruing.

Another rule very commonly relied on is, that if a fungus be pleasant to the taste, and its odour not offensive, it may be eaten. But this is not only a fallacious but an exceedingly dangerous guide. It is quite true some fungi are intensely acrid, and are irritant poisons; but, upon the other hand, *Lactarius deliciosus*, one of the very best of our British species, as its name implies, when eaten raw causes a very unpleasant amount of tingling of the mouth and tongue. Far more important, however, is it to remember that a fungus may have a pleasant odour and taste, and yet be most virulently poisonous. Mr. W. G. Smith was poisoned by eating less than a quarter of an ounce of *A. fertilis*, P., which had anything but a disagreeable taste. Again, *A. muscarius*, L., has no acridity, neither has *A. phalloides*, Fr., or *A. Mappa*, Batsch; and whatever may be the character of the two latter, the poisonous properties of the former are well known. It must be remembered that fungi may be irritant, narcotic, or narcoto-irritant poisons, and while it is possible to recognize an irritant by the taste, a narcotic may be nearly tasteless.

There is one way, and only one, by which edible fungi can be discriminated from poisonous ones with absolute certainty, and that is by a knowledge of the individual species. As well might a code of rules be laid down for the discrimination of wholesome from poisonous fruits or vegetables, as for fungi. People do occasionally mistake aconite-roots for horseradish, or fool's-parsley for parsley proper; but we have no general rules drawn up in this case, neither do people become panic-stricken and eschew the whole race of condiments because of these unfortunate accidents. But if any misadventure occurs from eating fungi, the whole race are scouted and branded as the harbingers of death. In this country fungus-eating is reserved for the few; but it by no means follows these few are experimentalists, far from it; for the species they eat have been known to be edible, and have been eaten, by the initiated from time immemorial, in other lands if not in this. Like other kinds of food, they vary much in flavour, in the facility with which they can be digested, and in their nutritious qualities. Certain excellent species cannot be too

widely known, and every housewife should be able to discriminate them, especially as they have all well-marked characters. Amongst these may be mentioned—*Agaricus procerus*, Scop.; *A. gambosus*, Fr.; *A. nebularis*, Batsch; *Lactarius deliciosus*, Fr.; *Coprinus comatus*, Fr.; *Cantharellus cibarius*, Fr.; *Hydnum repandum*, L.; *Boletus edulis*, Bul.; *Lycoperdon giganteum*, Batsch; and *Fistulina hepatica*, Fr.* Occasionally we hear vegetarians say they live upon some fabulously small sum,—a few pence per diem; and although very few people, indeed, would care to debar themselves of wholesome nutritious food for the sake of a mere theory; yet, it cannot be overlooked, that the continued and continuing increase of the population will eventually demand a full development of the resources of the country. There cannot be a doubt that the esculent species of fungi will, in the future, occupy a most important place in the dietary of the nation, not simply because of their cheapness, but rather by reason of their nutritious qualities and the large proportion of nitrogenous compounds they contain.

* Any one desirous of learning how to recognize edible and poisonous species should get Mr. W. G. Smith's "Mushrooms and Toadstools" (R. Hardwicke), and with a little care and ordinary attention no difficulty will be experienced in obtaining the necessary information. It is best to begin with some easily-recognized species, as *A. procerus*, *L. deliciosus*, or, best of all, the Giant Puff-ball. Should any one be really desirous to begin fungus-eating, but lack the necessary courage for the first attempt, from a fear lest he may have mistaken the species, if he were to send a specimen post-paid to the writer, or to almost any fungus-eater, he would most likely get a post-card stating the nature of the specimen by the next post.

THE MICROSCOPY OF STARCH.

THERE is, perhaps, no substance in the vegetable economy so important as starch, entering as it does largely into the composition of all classes of the Vegetable Kingdom, with the exception of the Fungi and a few of the Algæ and Lichens. And its still greater importance as forming a large proportion of the food of man, two-thirds of the human race subsisting on starch, alone renders it worthy of more careful study at the hands of microscopists and histologists than it has hitherto received.

Before going into its structure, let us look a little at the special function of starch as regards vegetable existence. Starch may be said to be to plants what fat is to animals—a reserve fund for the purposes of nutrition.

Plants produce by assimilation a larger quantity of formative organizable matter than they can require or employ at the time for cell growth; this is stored up in cells for future use as protoplasm, and in a much larger quantity as starch.

Starch always appears in an organized form as solid, rounded, or angular transparent granules, having stratified structure; their earliest appearance being as small bodies in the protoplasm, from which they receive growth and nourishment. And though the actual chemical nature of the formative material is still unknown, it is probable, as pointed out by Sach, that it is formed by chemical or physical changes from the sugar contained in the protoplasm. The next period in the life-history (if such a phrase be applicable) of starch is its assimilation as it develops and increases in size. It is well known that assimilation, being a process of deoxidation, can, with little exception, only take place in those organs that contain chlorophyl, and under the influence of sunlight.

Thus, starch is a carbon hydrate formed in chlorophyl by the decomposition of carbon dioxide and water under the influence of sunlight, or, as is now known, by the red, orange, and yellow rays of the solar spectrum with a little of the green, for it has been ascertained that the blue, indigo, and violet rays possess little or no assimilating power. In a paper recently contributed by Mons. Boehm to the Vienna Academy, it is stated that "the intensity of light which renders green plants capable of decomposition of carbonic acid, causes also a passage of the starch from the stem into the chlorophyl granules," so, according to this authority, it is "incorrect to say that *all* the starch that makes its appearance in starchless chlorophyl granules, when exposed to full daylight, is an immediate assimilation of carbonic acid." Later on, in the same paper, however, the same writer says, "By cutting starchless primordial leaves of the scarlet-runner in direct sunlight, and in an atmosphere containing 8 per cent. of carbonic acid, a demonstrable quantity of starch is formed within ten to fifteen minutes, while in leaves that were agitated in free air this only happened in three-quarters of an hour. "It is not improbable," the same observer sums up, "that the carbon of the decomposed carbonic acid unites immediately with water to form starch."

After undergoing assimilation in the leaves, starch undergoes a variety of chemical metamorphoses as it passes through the various tissues of the plant. Thus, in the potato it passes through the tissues of the stem in the soluble form of glucose, being again deposited in the tubers as starch granules. Glucose or grape sugar is in reality simply a combination of starch with the elements of water, as seen from its formula, starch being $C_{12}H_{20}O_{10}$, and glucose $C_{12}H_{24}O_{12}$.

Having described the general functions of starch and its mode of formation, we will turn our attention to the granules themselves. These vary in form and size from the $\frac{1}{250}$ to the $\frac{1}{6000}$ of an inch in different plants. In the centre of each granule or at its side or end is a nucleus, or hilum, as it is usually termed, from the old mistaken idea that the granule was by it attached to the cell-wall. Round the nucleus as a common centre are a number of granular layers intervened with water and sometimes air, the nucleus being the softest

and most delicate part of the granule, and containing matter of the most recent formation. In the process of drying the nucleus cracks, and being filled with air, frequently appears as dark lines under the microscope. The concentric or eccentric rings, as the case may be, were formerly supposed to be markings on the external membrane, but it is now known that they denote a system of lamination of cellulose.

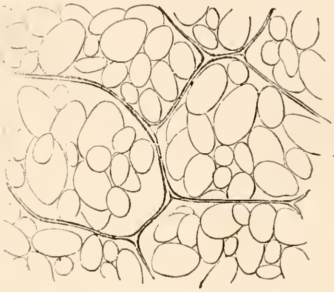

Fig. 119. Section of Potato, showing starch-grains *in situ.*

The mode by which starch granules increase in size has long been a problem, and even now continues to be a disputed point among microscopists; one party, including Henfrey and Griffith even in the last edition of the "Micrographic Dictionary," asserting that the granules increase by the superposition of external layers from within, so that the outermost layers would be the youngest, while another party, including such eminent authorities as Sach and Nagelli, assert that the layers are formed internally, the older ones expanding to make room for the younger. The latter theory, or growth by intussusception, seems most in accord with the most critical investigations on the subject; for if the external layers were added by deposition, the outer layer would be the least dense, whereas it is the densest part of the granule, and the nucleus the softest. Again, when two nuclei occur in one granule, a not uncommon circumstance, the strongest growth always takes place in a line where the nuclei meet; whereas, growth by addition to the exterior would probably tend to make the union of the nuclei closer.

The supposed mode by which growth through intussusception is brought about was first described by Nagelli. He supposes that the cellulose layer of a starch granule is composed of isolated solid molecules of various sizes held together by the force of cohesion and mutual attraction, between which water penetrates—the molecules themselves, as we might expect, being quite invisible, even with the highest powers of the microscope. The gradual increase in size of the granule is thus due to the absorption of water and formative material to the nucleus when it undergoes chemical transformation. Then its formation into granular and new cellular layers causes a swelling of the external cellulose by the pushing further apart of its molecules. If contraction take place, it is through the withdrawal of water from the interstices.

Fig. 120. Potato Starch (*polarized*).

We will now pass on to the more practical examination of starch granules. Probably every beginner at the use of the microscope has examined a thin section of a potato, than which nothing can better show the various sizes, shape, and position of starch granules, as they appear in their natural position in the cell.

Fig. 121. Starch Grains of Natal Arrowroot, Bermuda Arrowroot, and Wheat (latter concentric lamination).

The eccentric lamination is with a little care, as to light and focussing, easily seen and examined, as the granules roll about and over one another if a drop of water be placed on the slide. Now, though it would be difficult, and perhaps impossible, to state with certainty that any given granule was potato starch and no other, yet, examined collectively, and with regard to measurement of size, it would be impossible to mistake it for any other.

You might pick out, say half a dozen granules of Tous-les-Mois starch, and half a dozen of potato, and perhaps the difference would be indistinguishable; but examine any samples of each separately, and Tous-les-Mois will be found to be uniformly of a larger size, irrespective of other differences.

The importance of this branch of the subject in-

the present day in connection with the recent Adulteration Act is very great, and with the microscope it would be easy to go through dozens of different kinds of starches and find differences between almost every kind, even much greater than between the Tous-les-Mois and potato. About fifty different kinds of starches have recently come under my examination, many of which I have sketched with the aid of camera lucida to an exact scale of measurement.

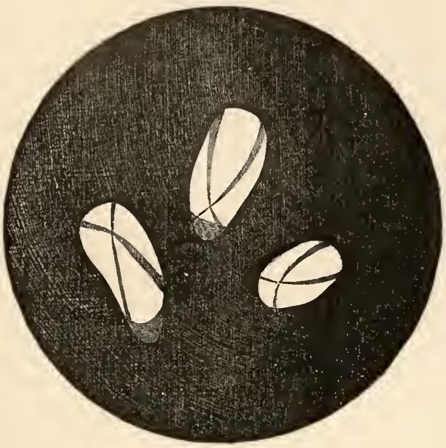

Fig. 122. Tous-les-Mois (*polarized*).

The chief characteristics to be noted in making an examination are: 1. Size and shape of granules, using micrometer scale. 2. Position, size and shape of nucleus, noting concentring or eccentricity of lamination. 3. Effect of polarization with or without selenite.

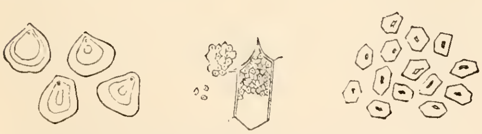

Fig. 123. Starch-grains of Yam, Rice, and Maize, 250 diam. × 6.

With regard to the size of the granule, though a single cell of any vegetable substance will contain granules according to progress of development, from the very smallest size upwards, yet few varieties of starches will be found to average the same size. Thus, a single cell of potato will contain granules from the $\frac{1}{1000}$ to the $\frac{1}{300}$ of an inch; arrowroot will vary between the $\frac{1}{1000}$ and $\frac{1}{500}$ of an inch; wheat rarely exceeds the $\frac{1}{1000}$; and rice will not exceed the $\frac{1}{3000}$, being usually about the $\frac{1}{6000}$ of an inch.

The shape of the granules, though more uniform than the size in a given starch, is variable. Potato starch might be described as ovate, but individual granules may be rounded or mussel-shaped.

Rice starch is usually angular, but many of its granules are round.

Yam starch approaches nearly to the triangular form.

So that both as to form and size, though it would be rash in most cases to pronounce with certainty the name from a single granule, yet we should be quite justified in doing so from the form and size of any sample.

The position and shape of the nucleus taken in connection with the lamination afford a valuable means of distinguishing starches. In lenticular grains, as in wheat, the layers grow in connective circles with central lenticular nucleus. But if as in potato starch the growth is in one direction, the layers with the exception of the one nearest the nucleus are eccentric to the nucleus, which is itself usually globular.

Fig. 124. Potato-granules, 250 diam. × 6 (eccentric lamination).

Fig. 125. Starch of French Lentils (concentric lamination).

In the starch of Indian corn the nucleus is usually very distinct, and the lamination in this and several other kinds so indistinct that it is only with the aid of high powers and the use of magenta solution that they can be at all distinguished.

On the other hand, Natal arrowroot can be readily distinguished even from other arrowroots by the special clearness of its lamination. From this fact, it has been frequently mistaken for potato starch, though it never need be, for apart from the wide difference in size, the granule being only two-thirds that of the potato, and the difference in shape of nucleus, the fact that the nucleus in the potato granule is usually at the smaller end, and that of arrowroot at the broader end, is sufficiently characteristic to prevent any confusion.

The characteristic markings produced by the polarization of starch are familiar to all microscopists, usually assuming the form of a cross or the letter X, the nucleus being the point from which radiation proceeds. The effect produced by polarization naturally varies considerably, according to the form of granule and other causes. Some specimens of the same kind polarize much more than others—a fact which has led to much error. Thus almost all authorities state that wheat and rice starches do not polarize at all, the fact being

that many *granules*, and perhaps entire samples, of wheat do not, except with a very high power, and even then its polarization is much less distinct than that of other kinds.

Rice I have found uniformly to polarize, and in its case the error has probably arisen solely from a neglect of employing a sufficiently high power necessary for its examination. It appears to be a popular error that the polariscope cannot be advantageously used with the higher powers of the microscope; but my own experience is that many starches cannot be properly examined with a lower power than the $\frac{1}{16}$, and the polariscope can be just as easily and correctly used with it as with any lower power objective. The interposition of a selenite produces not only a pretty effect, but often shows up peculiarities of form in the granule, and it is well to examine an object under all aspects.

The well-known and beautiful effect produced upon starch by iodine is of the greatest value to the microscopist. The application of a very weak solution of iodine in iodide of potassium, part of a drop of which is allowed to run (if from the aperture of a Highley's microscopic test-bottle, so much the easier to manipulate) under the thin cover of the suspected substance while under examination in the microscope, will at once detect with certainty the presence or absence of starch by the blue colour imparted to the granules, even when the granules are so minute that the unaided eye cannot perceive the colour, and where the transparency of the granules would prevent their being noticed by the microscope alone.

The value of this easily-applied test, in conjunction with the microscope, for the detection of food adulteration, as of butter, mustard, pepper, and a host of other of the commonest articles of daily onsumption, cannot be too well known.

Much might be said about the varied effects of temperature on starches if it came within our present province. Starch is usually said to be insoluble in cold water, and for the most part truly, though it probably applies to the cellulose only; for if the granules be ground up with fine sand in cold water the cellulose membrane is ruptured, and the solubility of the granulose shown by its expansiveness.

In conclusion, just a word as to the mounting and preservation of starches as microscopic objects. Whether any known process of mounting will render them permanent is disputed. My own limited experience on this point is that if the granules be dried without heat they can be well preserved in balsam, after the mixing putting in turpentine; they have kept good in this way for twelve months, and without any appearance of their becoming impaired in any way.

Glycerine in any form is unsuitable, from its solvent properties. If others can attest to the permanency of starches mounted in balsam, or by other means, a lasting collection of a very interesting kind can be made in a useful field of microscopical study, and one but little explained.

I. C. Thompson.

HOLIDAY RAMBLES IN THE WEST OF IRELAND.

The Plants and Rocks of Aran.

BY G. H. KINAHAN, M.R.I.A.

On these islands the geology and botany are very similar to those in the Burren, co. Clare. Most of the surface of the islands is bare limestone-crags, that rise in huge steps from the east and N.E. shores; while the western coasts are perpendicular cliffs cut by the tidal waves of the Atlantic. The surface of the islands is thus described by O'Flahertie:—"The soile is almost paved over with stones, soe as, in some places nothing is to be seen but large stones with wide openings between them, where cattle break their legs. Among these stones is very sweet pasture; so that beefe, veal, mutton are better and earlyer in season here then elsewhere." The islands are still famous for their good and fat cattle. In the coves, bays, and strands vast quantities of seaweed are cut in May and November, the latter crop being principally used for manure, while the May crop is dried and burned into kelp. To save the seaweed, the Aranites have to keep a number of ponies. These, however, after the May weed is all drawn up, are shipped to Hiarconnaught, where they grass during the summer, except on Sundays, when the Hiarconnaughtites collect them, at least the best of them, from the mountains, and run races with them.

From the following list it will be seen the rare plants are very similar to those in parts of the Burren:—

Rare Plants in Aran.—Ajuga pyramidalis, Astragalus hypoglottis, Helianthemum canum (Rock Rose), Viola hirta (Hairy Violet), Cornus sanguinea, Arundo epigejos, Lavatera arborea (Tree Mallow), Matthiola sinuata (Sea Stock, Straw Island), Arabis ciliata, Cerastium arvense (Field Mousear), Alsine verna, Geranium sanguineum (Bloody Cranesbill), Pimpinella magna, Asperula cynanchica, Rubia peregrina (Wild Madder), Adiantum (Maidenhair Fern).

In parts of the islands there are acres of the Adiantum; while in the neighbourhood of the ecclesiastical settlements are colonies of introduced plants, many of which are herbs or have medical qualities.

Among the limestone, which is a marked difference between it and that of Burren, there are thin beds of shales, clays, and clunch. These are most

important, and add greatly to the fertility and value of the islands, as they stop the water from percolating downwards through the limestone, and bring it out in lines of beautiful clear springs, usually at the base of the cliffs or steps, the clayey beds having in a great measure induced the former denudation.

An interesting feature to be observed in these islands is the marine denudation by the Atlantic on the western sides of the islands, as there the sea yearly quarries large blocks and hurls them up on to the surface of the cliffs, forming a rampart that has been called by Prof. King, of the Queen's College, Galway, "the Block Beach." This beach in one place, in Inishmaan, is on a cliff 170 feet high, and the largest block moved by the sea that was measured was 30 by 15 by 4 feet. On the south-east coast of Inishmaan, the block beach is peculiar; for while elsewhere the blocks in the beach are yearly rolled and tossed about, here for years they have not been disturbed; showing that since the beach was piled up, the set of the tide and waves has altered. In connection with the cliff of the west coast are "puffing-holes." These are due to

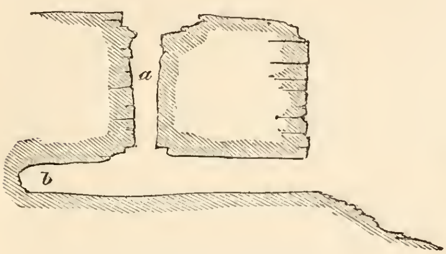

Fig. 126. Puffing-hole.

the sea-quarry-cut caves along dykes of fault-rock, while subsequently loose portions of the roofs fall in, leaving a funnel (*a*, fig. 126), When a huge wave comes in, it compresses the air into the extremity of the cave (*b*), which acts as an elastic cushion and forces the water up through the funnel, often to a considerable height.

On Inishmore we have an example how the drift of the wind changes. Ages ago the tract south of Killeany Bay was cultivated and inhabited, while subsequently all traces of its former inhabitants were buried by Æolian sands. Now, of late years, the drift of the sands is to the south-west into Gregory's Sound, and the old houses and field are being again exposed, as recorded by the Rev. W. Kilbride. Formerly Gregory's Sound was so rocky and rough, that it was impossible to fish in it; now this is not the case, as it has a deep sandy bottom.

Scattered over the surface of the crags of Aran, but especially on Inishmore, are numerous erratic blocks, many of them carboniferous sandstone, evidently the remains of the sheet of boulder-clay drift that once covered most, if not all, of the island. These blocks stand on short pedestals, as they have preserved the rock under them, while the surrounding surface has been more or less weathered away. As no carboniferous sandstone can be found in the neighbourhood of Galway Bay (although probably it formerly existed as shore-beds of the carboniferous sea bounding the granitic rocks of Hiarconnaught), they are called "Connemara stones," and have given rise to the following legend. On the hills called Slieve Moidaun, in Hiarconnaught, lived a giant, from whom they have received their present name, while a second, whose name is now forgotten, lived on Inishmore. They for a long time were on friendly terms, but at last they fell out, and amused themselves by pelting one another with stones, the Aranite throwing Aran stones into Hiarconnaught, and the Hiarconnaughtite returning in their place stones from his country. Unfortunately for the veracity of the legend, there are no carboniferous sandstones in this portion of Hiarconnaught, neither are the boulders of limestone, said to have been hurled into it, to be found. The pedestals under the erratics are accounted for by the giant and his family using the blocks as seats, and wearing away the rock around them with their feet.

ZOOLOGICAL NOTES.

Boatflies.

I HAVE often noticed on former occasions the sound made by Notonecta knocking against the sides of aquariums, and this sound was quite different, answering more nearly to the stridulation made by grasshoppers or crickets. My aquarium is a heavy wooden one with thick plate-glass sides, and has no ring in it like a bell-glass. I also noticed that the boatfly only emitted the sound when at rest, and the sound only commenced when the insect began to work its anterior feet across its proboscis, and ceased when it stopped that motion. On many occasions the boatfly was one or two inches from the glass side.

Caprella Acanthifera.

I dredged two, male and female, of these very strange crustaceans for the first time lately, and should be glad for a little more information about their life-history than is given in Bate and Westwood. Their movements are very remarkable. Holding firmly on by its hinder legs to a frond of seaweed, the Caprella waves its antennæ to and fro with a sort of bowing motion, similar to the Mantis, and presumably for the same purpose. The male is bright in colour, yellowish streaked with scarlet, while the female is of a dirty white, the only colour being a little red in rings on the antennæ.

The female gave birth to ten young ones one night, but I am sorry to say all were dead in the morning, probably from having been put in unclean water. The young are pure white, and have no tubercles on the back, but have the strange lobes

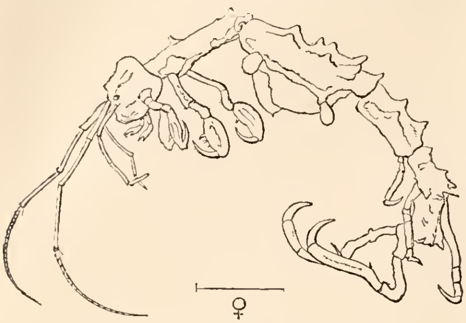

Fig. 127. *Caprella acanthifera* (female), mag.

on the sides, and the antennæ are not so long but thick. The large spine on the second foot is but half-grown. The male I unfortunately destroyed while under the microscope, but the female and young I have preserved in spirits of wine.

Palæmon Squilla.

In drawing one of these crustaceans from life, I notice that there is an error in Professor Bell's sketch in his "British Stalk-eyed Crustacea," though I suppose I am but killing the slain, and that this has often been pointed out before. Still

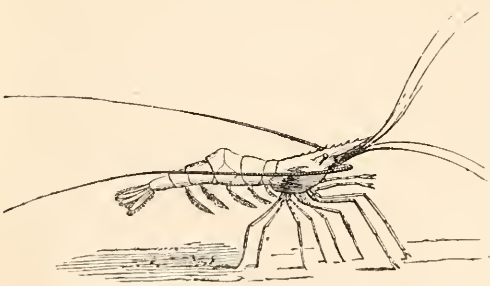

Fig. 128. *Palæmon squilla.*

it might mislead a novice on comparing the animal with the engraving. The swimmerets, or swimming feet, are all turned the wrong way, backwards instead of forwards. I think probably several of the delineations of other species have the same error. This Palæmon has just cast its shell, all in one piece to the very points of its long antennæ.

Tom Workman.

"I have often seen a cuttle completely spoil, in a few seconds, all the water in a tank, containing one thousand gallons."—*Henry Lee on the "Octopus."*

PROCESSIONARY CATERPILLARS.

In a letter received, 25th March last, from a friend staying in the south of France (Mentone), some interesting observations upon a species of the Processionary Caterpillar are recorded, which may be interesting to the readers of Science-Gossip. She writes—

"While out for a walk the other day we came across a curious incident in natural history. At Cap Martin, about two miles from Mentone, our attention was attracted by something by the roadside which looked, at a little distance, like a long thin serpent. At first we thought it best not to go very near, but curiosity prevailed, and upon closer inspection we found it was a long line, consisting of 99 caterpillars, crawling in single file close after one another. Our curiosity led us to remove one from the middle, a little distance from the others, and we found his place was soon filled up; but he crawled back to them and edged his way into the line again. Then we removed the leader: this brought them for a time to a standstill. After a little while they began to move on, and then we put the original leader in his proper place, but this brought them again to a standstill; and from the way they moved their heads from side to side, a great deal of talking seemed to be going on, and they decided their original leader was not fit to lead, and they chose another, while he had to make his way into the line lower down. A little further on we saw another line of 44 coming up in the opposite direction, and we were curious to see what would happen when they met, imagining they might perhaps have a fight; but such was not the case: they joined the others by degrees, and so made a much longer line and marched on.

"We have since heard they climb some particular kind of trees, and make their nests in them, which has a very injurious effect and often kills the trees, unless the branches are cut off which hold the nests."

In an interesting little work on "Insect Architecture," published in 1830, mention is made of these social caterpillars, the construction of their nests, and their processionary habits. The writer says:—"It is remarkable that, however far they may ramble from their nest, they never fail to find their way back, when a shower of rain or nightfall renders shelter necessary. It requires no great shrewdness to discover how they effect this; for by looking closely at their track it will be found that it is carpeted with silk, no individual moving an inch without constructing such a pathway both for the use of his companions and to facilitate his own return. All these caterpillars, therefore, move more or less in processional order, each following the road which the first chance traveller has marked out with his strip of silk carpeting." Further re-

marks are made of two species "more remarkable than others in the regularity of their processional marchings." "These are found in the south of Europe, but are not indigenous in Britain. The one named by Réaumur the Processionary (*Cnethocampa processionea*) feeds upon the oak; a brood dividing, when newly hatched, into one or more parties of several hundred individuals, which afterwards unite in constructing a common nest, nearly two feet long and from four to six inches in diameter. It is not divided into chambers, but consists of one large hall, so that it is not necessary that there should be more openings than one; and accordingly, when an individual goes out and carpets a path, the whole colony instinctively follow in the same track, though, from the immense population they are often compelled to march in parallel files from two to six deep. The procession is always headed by a single caterpillar; sometimes the leader is immediately followed by one or two in single file, and sometimes by two abreast. A similar procedure is followed by a species of social caterpillar which feeds on the pine in Savoy and Languedoc, and their nests are not half the size of the preceding; they are more worthy of notice from the strong and excellent quality of their silk, which Réaumur was of opinion might be advantageously manufactured. Their nests consist of more chambers than one, but are furnished with a main entrance, through which the colonists conduct their foraging processions."

The lady whose remarks are recorded above has since written that the species she observed feeds upon the pine-trees in the neighbourhood of Mentone. S. W. U.

THE MICROSCOPE AND MICROSCOPIC WORK.

No. X.—By F. Kitton.

THE term Engiscope was used by Dr. Goring to distinguish those instruments by which the image of an object was exhibited magnified by an eyepiece. The image might be produced either by reflectors or refractors (compound microscopes). He considered that those instruments with which we look at the object itself should be called microscopes, and as the magnifier might be a doublet or triplet, it could not then be called a simple microscope, but was in reality a compound one. The name, however, never became popular, and the term microscope is now generally understood to mean a compound instrument. The term *aplanatic* (without error) ought to be used instead of achromatic; a lens might be *achromatic* (that is, free from coloured aberration) and yet be a very imperfect one, unless its spherical aberration was also corrected.

Having briefly described the microscopes of fifty years ago, we will endeavour to give some idea of the work they were capable of performing, and perhaps we cannot do better than glance at the work done by Messrs. Goring and Pritchard. We will suppose, to quote Dr. Goring, that "the engiscope is set up and prepared for action; and observe, gentle reader, that here you may set up your staff, and procced no farther unless you like . . . Now, mind what I say, this instrument is like the Irishman's crooked gun, which used to shoot round a corner." (This of course alludes to the object being at right angles to the line of vision.) The Doctor then goes on in his quaint way to direct the student how he is to place the object, bring it into focus, &c., in all of which directions he is very explicit. He concludes with the following advice:—"Now, if you should not happen to succeed in getting everything to go exactly to your mind at first, do not curse the instrument by your gods, and throw your wig behind the fire, and then dance up and down the room like a maniac, as I once saw a Frenchman do; but have a little patience, read my directions over again, weigh well the import of every sentence, and try your luck over again."

The Doctor gives a humorous dialogue which is supposed to take place between an old naturalist who swears by the simple microscope. "If the reader must know the names of the parties, they are Tobias Oldbuck, Esq., the naturalist, and Mr. William Putty, the optician. Lest I should be accused of putting nonsense into the former gentleman's mouth, I must state that he only expresses opinions current among observers of this enlightened age, and which I have frequently encountered in society."

"I must positively introduce my personages to the reader. Mr. Oldbuck is an old bachelor of about sixty (a descendant of Oldbucks of Monkbarns). He always wears a very natty wig made by an eminent artist; his clothes are of the hue scientific brown study colour; he has not altered the cut of them, or the model of his hat, or any of his opinions on any subject, and declares he never will, thinking it beneath his dignity either to learn or unlearn anything at his time of life. Having described his costume, that outward and visible sign of a man's character, I do not think it necessary to say anything more about him, except at one period of his life he was far gone and most intently engaged in constructing object glasses for microscopes, which, however, he abandoned as an impracticable job. When another person afterwards succeeded in producing them, Mr. Oldbuck's pride was wounded in the tenderest place, for he considered himself a perfect giant in all sorts of microscopic science: in consequence the sight of an engiscope ever after turned his stomach.

"Mr. William Putty is an enthusiastic young

optician, whose talents are of the first order, and thinks we live in the golden age of these matters. His character the reader will find is a complete contrast to that of Mr. Oldbuck. Now it came to pass that one wet day Mr. Oldbuck was walking up and down in his study, occasionally surveying his wig in a mirror, and somewhat ruffled in temper by the impertinence of the junior members of a learned body to which he belonged, who worried him till (much against his will) he was forced to look into a very fine achromatic engiscope, which showed objects *too well* to please him. To vent his spleen he was indulging himself in the following soliloquy: 'What occasion have I or any man for any other microscopes than single ones? *Was there ever anything so ludicrously preposterous as forming the image of an object and viewing by a species of microscope called an eye-glass, instead of looking at the object itself with an eye-glass?* Are we not content with seeing Nature herself? Would any rational being rather behold a picture of a beautiful woman or landscape than see the reality? Away, then, with this nonsensical trumpery, and let me alone with my good old tried, staunch microscopes.'"

Mr. Putty is now introduced, and a long argument ensues, Mr. Oldbuck sticking up for his single lenses, and the former for his engiscopes. Mr. Oldbuck is even unwilling to admit that any other substance can be superior to glass, Mr. Putty having asserted that by making lenses of other substances of higher refractive and lower dispersive power, they would be greatly improved.

To which Mr. Oldbuck replies, that he could never see any better through lenses made of diamonds or other precious stones than those made of glass, and brings forward one of $\frac{1}{60}$ of an inch focal length and 55° angle of aperture, using as a test the scales of the diamond beetle, which, from their brilliancy, would "'show the aberration of the lens if it had any; but you see the scales perfectly clear and distinct.'"

Mr. Putty admits that the vision is clear and satisfactory, but that the lines are not well made out, and says he could show them much better with an engiscope—"'though I grant that I do not show you the lines themselves, but only a picture of them,—so exact, however, that——'

"'It will not impose upon me. I do not choose to trust to *pictures*, especially when I am exploring unknown objects. Your engiscope (as you call it) may do vastly well to exhibit known ones to a parcel of women and children.'"

Mr. Oldbuck continues to fight the ground inch by inch; and is asked if he will admit the superiority of doublets and triplets over single lenses, if he is shown something with them in a decisive manner which he would scarcely be able to see at all with one single lens out of twenty, and then only in a very imperfect manner. But Mr. Oldbuck is not going to throw up the championship of the single lenses so readily, and tells his antagonist, that

"'If you were to show me anything with another instrument which I cannot see with them (single lenses), I should be disposed to set it down *as an illusion of some sort or other;* and if you were to show me anything in a different manner from what they show, I should be very much inclined to think that they were right notwithstanding.'" (How very thankful we ought to be that no such prejudice in favour of certain objectives exists in the present day!) "'Well, what is the wonder you are going to show me? I suppose it will turn out to be the oblique lines on the brassica you are always making such a fuss about—an isolated instance, supposing the said lines to actually exist. I certainly have seen a few of the lines you allude to with a doublet of about $\frac{1}{20}$ of an inch focus.

"Mr. Putty: 'Have you seen as much with any of your adorable single magnifiers?'

"'I have seen them occasionally when they have been of very superior quality, and exquisitely set with large aperture, but I freely own not with sufficient distinctness to convince me of their existence. The appearance somewhat resembles the tissue of a coarse piece of canvas, with the fibres running diagonally, when it is placed too far off from the eye to allow us to see the threads distinctly. The doublet makes this difference, that a thread here and there seems stronger than the rest, and therefore more distinct, but, as I have already observed, I am strongly disposed to think the whole an illusion produced by oblique light.'

"'Have you seen the French brassica? The traces on it are still more difficult to exhibit, or fainter at least than those on the English variety, particularly on that kind which is of the form of a heart, or like the head and tail of the other kind, joined together with the intervening parts on.'"

Mr. Oldbuck is willing to admit for sake of argument that something can be said in favour of compound magnifiers; he also agrees with Mr. Putty, that an instrument capable of resolving some difficult test with a low power is preferable to one requiring high powers. Mr. Putty then introduces a new doublet made upon truly scientific principles, being a compound aplanatic lens of one kind of glass of Sir J. Herschel: its focus is $\frac{1}{6}$ of an inch.

"'Compound magnifiers, I believe, are at present far from that state of perfection to which they are capable of being brought, because the makers of them are generally pleased to vie with each other in trying who can insult science the most grossly in the principles which they adopt, though I grant that they work excellently well, according to them. Now, with this magnifier I think you will see tests which cannot be discerned with any sort of single lens, nor with this either, if you choose to reverse

it or turn either of the glasses the wrong way, so as to subvert the principle on which it is made.'

"'I like this sort of test better than the diagonal lines on the brassica. The name of Herschel carries with it weight and authority, but I must give full loose to my scepticism in the meantime, and assert that microscopes may be very good, and perfectly to be depended upon for making discoveries in all the ordinary branches of natural history and microscopic research, which will hardly show any of these precious things you have set up as tests, a plague upon them! Are we to be eternally bored to death with the dust of butterflies' wings and the scales of beetles? For my part, I don't value them a rope's end!'"

Mr. Putty politely tells him that he ought to be made to appreciate the uses and properties of a rope's end at their full value——"'nevertheless I myself will so far agree with you that I consider the whole family of lined tests as very exclusive sort of objects. It is very difficult to find others requiring the same penetrating and defining power. I think hardly any reasonable person can refuse to admit as proper tests for all microscopes, of what nature or kind soever they may be, the researches in which they are to be employed: such are the minutiæ of a fly's foot, the serratures on a human hair, the little pits on a mouse's hair, the tissue of the moss Hypnum; and to these must be certainly added the eyes of several animalcules. If an instrument cannot show these you would reject it as unworthy of confidence?'

"'My dear sir, you now begin to talk like a rational being. I cordially agree with you: *all these things single lenses will show in perfection.* Do you know I had such satisfaction the other day in showing a young puppy the eyes of a wheel animalcule with a single equi-convex lens. He thought, forsooth, to have come over me with his thingamy, his hang-his-scope, as I think he called it.'"

All Mr. Putty's arguments are of no avail; and as a last resource he asks him to look at a podura scale in the engiscope, if he is not afraid.

"'Afraid, indeed, a likely joke!'

"'Can you say you have seen this object as well in your single, or I will say in your compound magnifiers? Say, on your honour!'"

"'I cannot say upon my honour that I have seen the lines so dark and so decidedly made out; but the circumstance is easily accounted for by the *superior darkness* of the engiscope. But I told you before, engiscopes cannot be trusted for exploring unknown objects or making discoveries: the whole is an illusion. I see your patience is nearly worn out: I will not plague you any more, except to view the diagonal lines on the brassica *in the instrument which discovered them—the reflector of Amici.* They are shown so decisively in this instrument that it would be as reasonable to doubt their existence as that of ruled lines in a copy book. Doublets and achromatics sometimes show them, sometimes not; but *the reflectors never conceal the truth.* Moreover, observe the perfectness of the longitudinal lines. *No dots!*'"

Mr. Oldbuck says that it would naturally show them darker, the reflecting being still darker than the refracting engiscope.

After this, Mr. Putty found it would be no use to make any further attempt to convince Mr. Oldbuck of the superiority of the engiscope over his favourite single lenses.

We have given these extracts from Dr. Goring's amusing chapter on trying microscopes and engiscopes, as it very accurately represents the capabilities of microscopes forty years ago, and the kind of objects that were considered as tests for the resolving powers of refracting and reflecting objectives. We are enabled to see what the achromatic microscope could do in its infancy, on objects that would now be considered useless as tests for even the cheapest achromatic of the present day.

(*To be continued.*)

THE LEPIDOPTERA OF THE NEW FOREST.

IN the December number of SCIENCE-GOSSIP, an inquiry was made for a good work on the New Forest. I would advise your correspondent to procure "The New Forest Handbook, Historical and Descriptive," by C. J. Phillips (Southampton, Gilbert).* There are chapters on the botany and ornithology, and an extremely interesting one on the entomology, of the district, by my friend Mr. Corbin. There is also a capital map designed by Mr. J. H. Roberts, one of the Forest surveyors, especially for the work. The price is nominal, *viz.* 1s. 6d.

The few remarks following are written with the hope that entomologists will be induced to contribute notes on the Lepidoptera, &c., of other celebrated localities, such as Epping, for the purpose of comparison. I am indebted for the number of the species to J. R. Wise's admirable book on the New Forest.

Out of our short list of seventy species of Diurni, forty-six have been taken here, and it is one of the very few spots where that glorious variety of the female Paphia, Valezina, is to be obtained; boasting also such local insects as *Aporia cratægi*, *Hesperia paniscus*, and *Leucophasia sinapis*, of which my brother and I have taken there a goodly series.

In the Heterocera we find, in the Nocturni over seventy species, in the Geometers more than one hundred and eighty, and in the Noctuæ nearly two

* May be had also of G. B. Corbin, Ringwood.

hundred, [some of them almost peculiar to the locality. Here it was that the new burnet, *Zygæna Meliloti*, about which so much discussion has arisen, was first discovered; and here we seek too, for two of the finest of the Lithosias—Quadra and

Fig. 129. *Valezina* variety of female *Paphia*.

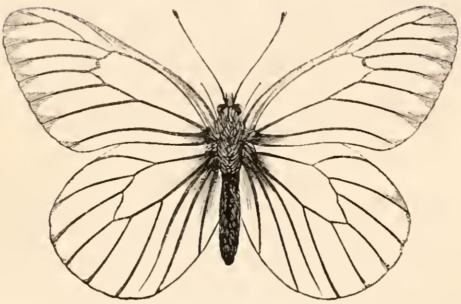

Fig. 130. Black-veined White (*Aporia cratægi*

Fig. 131. Chequered Skipper (*Hesperia paniscus*).

Fig. 132. Male of Woodwhite (*Leucophasia sinapis*).

Cribrum. I was not aware that the former came to "sugar," till one night rewarded with a pair of fine males. It is a rather extraordinary fact, that the majority of those bred turn out females. The rare little *Acidalia emutaria* is another Forest insect, not to be taken, however, without much trouble and discomfort. It flies in the evening over bogs, and to get it you must, as Mr. Tugwell, who is well up to this work, jocosely expresses it, "go bog-trotting," not minding an occasional immersion in black slushy mud. This is the home of those handsome Catocalas, Sponsa and Promissa. In 1872, both of these absolutely swarmed, and the late Mr

Fig. 133. Male of Four-spotted Footman (*Lithosia quadra*).

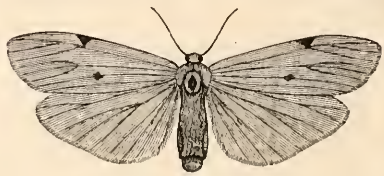

Fig. 134. Female of Four-spotted Footman.

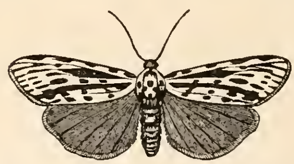

Fig. 135. Speckled Footman (*Eulepia cribrum*).

Fig. 136. True Lover's Knot (*Agrotis porphyrea*).

Fig. 137. Rednecked Footman (*Lithosia rubricollis*).

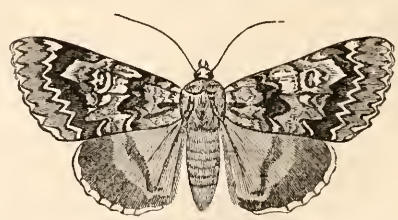

Fig. 138. Light Crimson Underwing (*Catocala promissa*).

Davis, the discoverer of *Phycis Davisellus*, told me there was little need of "sugaring" the trees, specimens coming in numbers to the old sugar-spots

long before the sun set. Alas! it is very different now, and what else could be expected, seeing the wanton destruction indulged in, one collector boasting that he had himself taken several hundreds, and another more than he could "set"?

Fig. 139. Light Crimson Underwing (*Catocala promissa*).

Fig. 140. Dark Crimson Underwing (*Catocala sponsa*).

As might be imagined, where the different kinds of Ericaceæ grow so luxuriantly, heath-feeding species turn up pretty commonly; such as *B. rubi*, *Porphyræa*, and more rarely *Agathina*. There are but two drawbacks of which I know to the pleasure of the collector in the New Forest. First and foremost, the water is vile, at least about Brockenhurst, tasting like a decoction of the rottenest leaves; and next, the pertinacious attacks of two most bloodthirsty flies—*Hæmatopa pluvialis* and *Chrysopis cæcutiens*, to bear which will require a skin as tough as leather and the patience of Job. I well remember one hot sultry day in July, the year before last, when after Valezina, my brother, a friend, and myself were so beset by these torments, that we gave up collecting Lepidoptera in despair, and turned our attention for the while to Diptera. Swinging the

Fig. 141. Rosy Wave (*Acidalia emutaria*).

nets to and fro, we caught scores of these flies; then getting them into one corner of the net, we wrung the net, and at the same time their necks, if flies have necks, and turned them out into little heaps, as a warning, we hoped to others; but of no avail, "the cry is still they come," so we were fain to beat a precipitate retreat.

Chichester. JOSEPH ANDERSON, JUN.

"AIR-BUBBLES" AND MOUNTING IN FLUID.

WHERE *do* they come from? is a question that has been often asked, but never answered. It is no uncommon circumstance to find a slide, after it has been mounted only a very short time, showing one or more air-bubbles, although, to all appearance, perfectly free from them when first done. This has always been looked upon as a great mystery; yet, if we "infer the unknown from the known," as suggested by Faraday, we shall not be long in discovering the truth.

Being one of the earliest workers at the "Electrotype," as it was then termed, we were, at first, greatly annoyed by the newly-formed metal being occasionally inseparably united with the metallic mould upon which it had been deposited; but it was soon discovered that the cause of separation was due to *a film of air* being adherent to the surface of the metal, and serving to prevent their adhesion. On the other hand, when the metallic moulds had been washed in hot water, or were immersed in the fluid while warm, this film of air had been driven off, and the metals adhered together as the consequence.

If we drop a portion of water upon a glass slide,

the two will be separated by this film of air until it be got rid of by rubbing or heating.

Place a drop of Canada balsam upon a *cold* slide, and then hold it over a flame, when it will soon become filled with minute air-bubbles, which are generally attributed to the balsam boiling, but are in reality only this air-film separated from the surface. But make the slide hot in the first instance, and then let the balsam fall upon it, when it will instantly spread itself "as clear as crystal," without the slightest trace of an air-bubble making its appearance unnecessarily, unless made hot.

By the same rule, when a *cold* cell is filled with fluid, this air-film lines the whole surface of the interior; but after a short time the liquid, by gravitation, insinuates itself beneath it, and it then becomes detached and accumulates as an air-bubble.

Now there are two ways of combating this evil. Either, means may be taken to get rid of the air-film first, either by wetting or warming, or it may be left to the ordinary course, and the cover put on only temporarily until the bubble has formed, when it may be got rid of, and the mounting completed without a like result being repeated. In fixing down the cover permanently upon a cell containing fluid there are certain precautions indispensable to success. In the first place, the cement must be of a nature not to be softened by the fluid inside. In the next place, its composition must be such that it will harden *throughout*, and not merely on the outer surface, while it remains soft and tacky within. But in addition to these it is essential that the surface of the glass should be perfectly clean and free from grease, through being handled, as well as devoid of the separating air-film. If these points be strictly attended to, there need be then no fear of subsequent imperfections.

For almost every other description of fluid except spirit there is no better material for securing the covers with than good shellac dissolved in wood-naphtha: this makes a cement which is very adhesive, and remains tough for some considerable period, and has but little tendency to crack or separate from the glass; but then, like Ackland's asphalt,* it must be remembered that it is not a finishing varnish, but is to be considered only as a *fastening-down* agent for putting on covers, and making thin cells, and keeping them tight, and to be covered over with some external protective of greater lasting toughness.

Having filled the cell, and got rid of the air-bubble, the next point will be to keep the cover from shifting whilst cleaning off the superfluous liquid. Take a piece of fine sewing-cotton, about three or four times the length of a slide, wet it, and then bind it over the middle of the cover and around under the slide, making four or five turns, and securing the ends by twisting them together. Now clean off the fluid roughly from the surface, either by blotting-paper or fine rag, and then put a minute portion of the lac solution in the angle at the edge of the cover at four equidistant points, and a minute or two afterwards remove the thread and leave the slide for a few hours to dry. After this the surface may be more thoroughly cleansed, and the ring of cement completed on the turn-table. It is not sufficient that the cement be only suffered to flow over the surface of the glass merely; but a small quantity should be first well rubbed down, so as to get rid of the air-film, and secure a perfect contact with the glass; and hence it is that a sable-brush is better than a camel-hair pencil, on account of its being stiffer and more elastic; after which more cement may be added until the required thickness has been attained. For obtaining a really clean surface there is nothing equal to the plan of dusting it over with finely-powdered whiting—or "creta præparata" of the shops is best,—and polishing this off with a clean soft cloth. The lac varnish will be greatly improved both in appearance and in quality by having two or three crystals of magenta added to each ounce of the solution, in which it readily becomes dissolved; but as it is not always easy to form a neat narrow ring without the cement spreading further than desired upon the glass slip, this need not be heeded at the time, but should be trimmed off on the turn-table afterwards. It should be kept in mind that if the slide be expected to have a neat and perfect finish when completed, care must be taken with the first layers to have them smooth and even, otherwise it will be almost impossible afterwards to obtain a good shape and surface upon a rough foundation.

With glycerine and castor-oil it is thought to be a difficult matter to secure the cells from leaking; but it may be set down to be entirely a matter of care and perfect manipulation as against slovenliness and insufficient attention to cleanliness of surface. As all fluids expand and contract by difference of temperature, it is needful to have a good body of cement over the cover's edge to resist the strain, and, as an external coating, the engine-maker's putty (white lead, red lead, and litharge, with drying-oil) is probably the strongest and best-holding material that can be used. This is sometimes made up with japanners' gold size, and in this case there is no objection to the latter material, because both red lead and litharge are powerful "driers," and soon convert the whole into a hard and solid mass: it is only when no driers are made

* When newly-made, this cement was found to be disposed to become lumpy on being thinned with benzole, but by age and keeping sufficiently thin it has quite lost that tendency, and now works as freely as can be desired. At present, I believe, this cement is only to be obtained at Horne and Thornthwaite's, in the Strand; but as it is a most undoubted boon to the mounter and can hardly be spoken too highly of, it is to be hoped that ere long it will be obtainable at every micro depôt in the kingdom.

use of, as in the case of asphalt and gold size, that its objectionable quality of spreading and running in is so prominent; but here again this defect is very commonly made more active by its being used in too great a proportion, instead of only just sufficient to destroy the brittleness of the asphalt; although even then, if it be used over a layer of the lac varnish, it will scarcely be possible for it to do mischief in any way.

W. Kencely Bridgman.

MICROSCOPY.

New Medium for Mounting.—I am desirous of directing the attention of your readers who are working with the microscope, to make trial of a new medium for preserving objects. I have not been able to give it much trial, but I think it promises to work well, and therefore I request some space in your columns. I have for a long time desired to obtain a medium which will receive without disturbance a specimen which has been subjected to the action of glycerine, or perhaps carbolic acid, the medium being one which does not remain fluid, but will set. I think I can propose one which is worth trial, or may lead to the formation of a better. I, however, think it needful to any who may be disposed to try it, to institute a few easy experiments before fully following out the trial of the medium I propose. I employ chloral hydrate as a basis. This chemical compound will dissolve and unite perfectly with many substances, and from some of its combinations we may obtain mediums which may vary from a fluid to a jelly-like or gum-like consistence. Chloral hydrate, besides uniting with gum and resins, also unites with alkaloids; as salicinine, quinine, and cinchonine. Place a small portion of chloral on a glass slide, add a little portion of water, and a nearly equal bulk of either of the above; gently heat over a flame, mixing the two materials with a needle or glass rod: these will unite, and when cooled be found to be viscid and clear. To such a mixture camphor can be added or glycerine. If a number of such experiments be conducted, the operator will soon find out what he is likely to obtain, and thus contrive a new medium suited to some objects. I propose the following:—Make a nearly saturated solution of chloral in water; filter, and then add sulphate of cinchonine to near saturation. A portion of this combination is placed on a slide, heated slightly and allowed to cool. The object is then placed in it and the cover applied, which, however, requires to be cemented with gum solution, and then Bell's cement or Canada balsam. To this "artificial balsam," as I am inclined to call it, I have added a little dextrine, so as to render it more solid. Your workers can make trial, and report on it. Glycerine and dextrine together boiled, and then chloral hydrate added, make a clear solution, which, I think, may be tried also.—*Thomas Shearman Ralph, Assoc. Linn. Soc. Lond., Kew, Melbourne.*

Polariscope Apparatus.—Presuming others would be glad of simple additions to the microscope, I have ventured to send you a full-sized sketch of apparatus I have made for use with the polariscope. A, a disk of talc (probably selenite would do better) fitted in the end of a pin, so that it may be revolved and placed at any angle with the object. The effect produced is very beautiful, the ground colour changing with the slightest variation of the

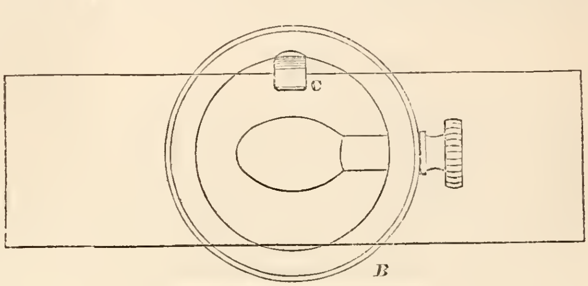

Fig. 142. Polariscope Apparatus.

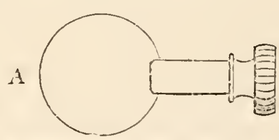

Fig. 143. Disk of Talc fitted in Pin.

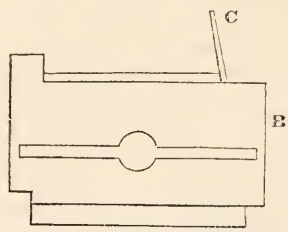

Fig. 144. Fitting for revolving Stage.

position of the disk, giving blue, green, purple, orange, violet, &c. It will be found necessary to revolve the prisms or stage, as sometimes, after altering the angle of the disk, no colour appears; but the slightest movement of the revolving stage of the microscope gives the ground colour. B is the fitting for it: the bottom part fits into the object-holder on the stage. C is a small spring to keep the object in position.—*George Leggett, Norwich.*

The Bramhall Oblique Illuminator.—In my last communication about my Oblique Illuminator,

I said I had found only one test which I could not resolve, viz. *Stauroneis spicula.* I have lately succeeded in obtaining a very fair view of the lines by using the greatest possible obliquity of light (sunlight from the left), and bringing the valve just within the field on the opposite side to the light. My glass may not be equal to more (Siebert's No. 7). The Illuminator professes simply to bring out in a cheap and easy manner the actual powers of the glass, be they what they may. Professor H. S. Smith, of the United States, tells Mr. Kitton he has long known of this plan of illumination, having used a piece of looking-glass with a ledge. He must have thought little of its utility, or kept it to himself, for I do not know any one on this side the Atlantic who has heard of it. I certainly had not.—*John Bramhall.*

ZOOLOGY.

NOTES FROM THE BRITISH ASSOCIATION.—This year's meeting will long be memorable for the comprehensive, philosophical, and eloquent addresses of Mr. A. R. Wallace, and Professor Newton. The former touched lightly but suggestively on all the topics which have been raised since the publication of the "Origin of Species," and we would strongly advise all our readers who can, to peruse the address. Professor Andrews, the President of the Association, in his inaugural address, also dwelt upon various zoological questions. Speaking on the ravages of insects, he said they have ever been the terror of the agriculturist, and the injury they inflict is often incalculable. An enemy of this class carried over from America, threatened lately with ruin some of the finest vine districts in the south of France. The occasion has called forth a chemist of high renown; and in a classical memoir recently published, M. Dumas appears to have resolved the difficult problem. His method, although immediately applied to the *Phylloxera* of the vine, is a general one, and will no doubt be found serviceable in other cases. In the apterous state the *Phylloxera* attacks the roots of the plant; and the most efficacious method hitherto known of destroying it has been to inundate the vineyard. After a long and patient investigation, M. Dumas has discovered that the sulphocarbonate of potassium, in dilute solution, fulfils every condition required from an insecticide, destroying the insect without injuring the plant. The process requires time and patience; but the trials in the vineyard have fully confirmed the experiments of the laboratory. We recommend this specific to such of our readers who have been asking various questions in our columns as to how insecticide can be effectively carried on. Sir Wyville Thomson's discourse on the results of the *Challenger* expedition was listened to by upwards of two thousand people, but it is too extensive for us to do more than allude to it here, especially as we endeavoured to keep our readers posted in the most important discoveries made during its progress. A good deal of Sir Wyville's discourse turned on the physical geography of the sea, and the origin of currents. One of the most powerful agents he evoked was the excess of precipitation over evaporation in the northern hemisphere, and the contrary in the southern. Mr. Murray, one of the naturalists on board the *Challenger*, read a long paper on "Ocean Deposits and their Origin," in which he showed the kind of work being done by lowly-organized animals in the deep seas. Another important paper was that by Mr. G. J. Romanes on the "Nervous System of Medusæ," in which he showed from experiments that along the margin of the disks of Medusæ there was situated an intensely localized system of centres of spontaneity, or *ganglia*, to which the contractions of the disk were due, so that he considered he had finally settled the long-vexed question as to the nervous system in these animals. He further showed that there was no other instance in the animal kingdom of so great a disproportion between the mass of central nerve-substance and that of the system it was capable of animating, as there was between the mass of the margin and that of the bell of a large Medusa; in one case this proportion being only that of 1 to 30,000,000. This year's meeting was noted for the presence of a great many foreign naturalists of high repute; such as Prof. Hæckel, Prof. Cohn, Prof. Grube, and others. Prof. Hæckel read a paper on the Lowest Forms of Sponges, in which he stated that in all animals above the rank of protozoa, there existed at an early stage of development two distinct cell-layers; one from which all the organs of animal life were developed, the other those of vegetating life. All animals might then be divided into two classes,—those in which there was no internal body-cavity—the Protozoa; and those in which such a cavity existed—the Metazoa. From these latter were developed, on the one hand, echinodermata and cœlenterata, and on the other vermes; through which latter again all the other groups of both invertebrates and vertebrates were developed. The zoologists were enabled, by the kindness of Mr. Duncan and Mr. A. B. Stewart, to have several days' dredging in the Kyles of Bute and the adjacent lochs. Of these we say nothing now, except that they were days long to be remembered for the spoils captured, as we intend relating some of our experiences thereon at length in an early number of SCIENCE-GOSSIP.

GOLD-FISH BREEDING.—In reply to many queries respecting gold-fish breeding that have appeared in SCIENCE-GOSSIP, it may be interesting to readers to know that they can be successfully bred in an

aquarium. I have twenty strong healthy fish from ova deposited in my tank. The young fry are not more than a month old, and vary from three-quarters to an inch in length. Already I feed them with quantities of gnat larvæ every day, and have not had a single death amongst them yet. Unfortunately the parents were removed from the aquarium too soon, or I might have had a great many more, having obtained nearly a tablespoonful of spawn from the female afterwards, which I tried to vivify with the male by mixing the milt with it, but failed. It did not show any sign of hatching excepting a cloudy nucleus.—*W. Elliott.*

BOTANY.

Notes from the British Association Meeting.—There was a striking absence of botanists from this year's meeting, although Dr. Hooker, Mr. George Bentham, Prof. Cohn, Prof. Balfour, Prof. MacNab, and others were present. We have seldom seen botanical papers in such weak force. Mr. A. R. Wallace's remarks on the relation between the colours and perfumes of flowers and insects added new light to this important subject, for he showed that certain sun-birds and humming-birds fulfilled botanical functions in this respect. One of the most promising young botanists of the present day, Dr. J. B. Balfour (son of the venerable Professor of that name), read a series of notes on "Mascarene Species of Pandani." The Mascarene Islands are in the Indian Ocean, some distance from the Mauritius, and these islands are characterized by very peculiar genera of plants. Of twenty-two species of *Pandanus* found in the islands, twenty were peculiar to them. Mr. George Bentham, speaking on this paper, said the *Pandanus* was a plant in which they had very great interest, because it was known to be one of the Pandani representative of some of the oldest types of vegetation, and, like all old types of vegetation, it was distinguished by endemic species, confined generally to very limited areas of territory. Very little was known about the plant; indeed, a great number of the species were almost unknown to botanists. Another important paper was one by Prof. Cohn, well known to English botanists, not only for his paper on *Volvox globator*, but for his general researches in Algæ. The Professor, in good English, discoursed on some experiments on the formation and mode of growth of artificial silica-cells, and performed some of them before the company, in order to throw light on the structure of diatoms, &c. Prof. Burdon-Sanderson gave us an account of further researches on the leaves of the Fly-trap (*Dionea muscipula*). He exhibited a fine specimen of the Fly-trap, and described the formation of the plant, how the leaves closed when a fly lighted on them, and how the insect was held by the hairs which crossed each other in triangular form, and which were so jointed that, when the leaves closed, they were not broken. He next gave the result of experiments made on the plant with an electrical apparatus. At the Bradford meeting he had brought forward certain new facts relating to the electrical changes which took place in the leaf of the Fly-trap in consequence of mechanical irritation. These changes were of such a nature as to show, first, that the leaf, when in the normal state, was electromotive; and, secondly, that when excited, either mechanically or electrically, it became the seat of electrical changes of a very remarkable kind. He drew a most interesting parallel, which he then, and still, thought justifiable between these changes and those which occurred in animal muscle, and in the excitable tissues of animals in the process of excitation.

Destruction of Rare Plants.—In the hope that others will take up the note, and sound an alarm far louder than I can do, I wish to direct the attention of all *real* botanists, all *true* lovers of the science, to the pitiless destruction that is everywhere going on among our rarer indigenous plants. It is not necessary for me to enter into full details, for to many the fact will be only too patent; but I will simply speak of what I personally can vouch for. Only a few days ago a relative of mine went to pay a visit in one of the secluded parts of Surrey, with the hope of making some valuable additions to his herbarium, as the locality is famous; but on inquiring of a botanical friend who resides near, he was told, that on account of the rapacity of collectors, they had nearly all disappeared! Last year I was at Cheddar, a place where several rather uncommon ferns are to be found, and I was told that in the season large quantities are grubbed up, and sent off by railway. The rage for ferns is now so universal that, if it long continues, the rarer and prettier kinds will almost disappear. I was informed a short time ago by a gentleman who knows what is going on in the botanical world, that some one has a commission to gather five hundred specimens of each of our rare plants to send to America! It would be difficult, in such a case, for many of our rarities to escape complete extirpation. What is to be done? Two things may at least be observed; one is, whoever is collecting specimens, ought to be particularly careful not to gather more than is necessary, not to uproot a plant, and, if possible, to leave ripe seeds. Many do great harm from thoughtlessness rather than greediness. Also, one must be most careful not to divulge the locality of any rare plant without knowing something of the person who applies, and in return a promise of absolute secrecy should be required. I am in possession of the knowledge of several localities of

uncommon plants, for which I gave my word not to divulge the place to any one, and I would not break it on any account, as I look upon it as sacred. In one case I refused information to a well-known botanist, who was very wishful to know where I gathered a certain specimen, having promised not to divulge the locality. I kept my honour, and also satisfied him by giving him a duplicate of the plant required. I hope these few hints may be the means of calling attention to this serious matter.—*H. E. Wilkinson, Anerley, S.E.*

Testing Fungi.—Being practically acquainted almost from childhood with most of our common edible fungi, allow me to assure your readers generally, and "J. P. Soulter" in particular, that the test he quotes for ascertaining the wholesomeness or otherwise of mushrooms is not only fallacious, but likely, if relied upon, to lead to mischief. As a matter of fact, whether bruised with a gold ring or with the finger, or in any other way, most fungi would show a change of colour. The only mushroom I remember which would turn yellow when bruised is the St. George's Mushroom (*Agaricus gambosus*), one of the earliest of the true mushrooms; and therefore, though it is perfectly wholesome, it would be condemned by the gold-ring test. The Ox Mushroom (*Agaricus bovinus*), another edible variety of the common mushroom, properly so called, would turn of a dull red colour. I suspect (though I have never actually tested it) that many of the poisonous fungi would fail to show a yellow tinge when bruised. Some, as the poisonous boleti, would turn green, purple, or blue, and others would doubtless show little or no sign of yellow. The safest guide to the edible kinds is a careful study of one of the good books now published on the subject; and no one should attempt to eat fungi unless he has first assured himself of their wholesomeness by this means, or by the practical teaching of some one who knows what they really are.—*Martin Gardner, Leyton.*

Volvox Globator.—In answer to the inquiry in a recent number (August) as to the Volvox only being met with in June, in my experience I have met with them this year in May, and every month up to the present, and last year I certainly met with them in September. With respect to the Rotifers in Volvox, they are mostly found in the latter months. I have seen specimens almost daily the last three weeks, and not only Rotifers, but Rotifers in the egg, showing movement of the cilia and of the gizzard, and also eggs not so far developed. In *one* Volvox which I examined last night I saw three active Rotifers, two eggs showing movement, four eggs similar but quiescent, and four green spheres; *thirteen* in all. There is, in my opinion, no question that some Rotifers are developed *in* the Volvox. The study of the Volvox at this particular time is well worthy of the attention of the microscopist.—*G. F. Chantrell, Hon. Sec. M. S. of Liverpool.*

White and Scarlet Thorn.—At Desercreight Rectory, Tullyhogue, co. Tyrone, there is a scarlet thorn budded on a white species, which bears flowers alternately white, scarlet, and pink. This, I think, proves that the sap affects the colouring of the florescence, as in the case of the Cytisus budded on the Laburnum, which produces racemes of yellow and purple flowers alternately.—*S. A. Brenan.*

Peculiar Horse-chestnut.—A horse-chestnut at Ardbraccan Palace, co. Meath, covers nearly a quarter of an acre, having the peculiarity of the banyan-tree, the branches falling and taking root again.—*S. A. Brenan.*

Botany of the Isle of Wight.—Having been for some weeks this summer at Niton, in the Isle of Wight, I can state, for the information of botanists, that *Cyperus longus* is still growing plentifully in its old station near St. Catherine's Point, as discovered by the late Dr. Bromfield. Near it grow *Mentha rotundifolia* and *Astragalus glycyphyllos*, the latter in the rocky fields adjoining. *Sambucus ebulus* is to be found near the lighthouse, and *Carex distans* in its old station by the side of a brook at Rocken End, along the banks of which *Hypnum commutatum* is abundant, but I could not find any fruit at all. In the sandy districts of the interior there is found *Agrostis setacea*, that very beautiful grass, and I once found another equally beautiful about a couple of miles in the interior, viz. *Gastridium lendigerum*. In some of the swamps by the Medina *Lastrœa thelypteris* is in great profusion, and in the bogs *Comarum palustre*, *Menyanthes trifoliata*, and *Sphagnum* in fruit. *Geranium lucidum* is plentiful in the lanes, and on the top of the cliff about halfway towards St. Lawrence (from which, by the way, a most magnificent view is to be obtained), *Carduus marianus*, and *Caucalis daucoides*, and among the trees, at the foot of the cliff in the same place, *Cryphora heteromalla*. As stated in the "Phytologist," *Rocella tinctoria*, var. *Phycopsis*, covers half of the church at Godshill. Among the algæ *Maugeria sanguinea*, *Halurus equisetifolius*, and *Davya coccinea* are plentiful. Mr. Grattan, in his interesting book on the sea-weeds, states that he finds *Davya coccinea* most plentiful in the coves west of Ventnor, and I can fully corroborate this. It is singular that, though I searched carefully, I did not find one single specimen of any one of the *Nitophylla* so common at Dover and Folkestone.—*T. W.*

Ferns found at Sopley, and Neighbourhood, Hants.—Thinking it might interest some

readers of SCIENCE-GOSSIP to know, should they be visiting this place, what ferns are to be found here, I append the following list. Among the most common are, *Lastrea filix-mas*, *Polystichum angulare*, *Pteris aquilina*, and *Asplenium adiantum-nigrum*; the latter fern growing thickly in every hedgerow. There are plenty of *Athyrium filix-fœmina*, and an entire lane lined on either side with *Scolopendrium vulgare*. *Asplenium Ruta-muraria* grows on the old church at Sopley, where it thrives well. *Osmunda regalis* is to be found in a hedge near Herne station, about two miles from Sopley. *Polypodium vulgare* and *Blechnum spicant* are also plentifully distributed throughout. *Ophioglossum vulgatum* is said to be found in the meadows near Christ Church Priory, three miles from Sopley, though I was never fortunate enough myself to obtain a specimen.—*F. R., Shepherd's Bush, W.*

GEOLOGY.

NOTES FROM THE BRITISH ASSOCIATION.—The section devoted to geology was very ably presided over by Professor Young. Among the specimens exhibited were Dr. Slimon's fine collection of the great Silurian crustacean named *Slimonia*. There were several so-called species of this creature; and when Dr. Slimon had exhibited them, Mr. J. E. Taylor suggested the species might be only larval stages in the life-history of the huger forms. The Duke of Argyll's paper on the Physical Geology of the Highlands was very popular and interesting. Mr. James Thomson's magnificent collection of Labyrinthodont remains, as well as his prepared sections of Carboniferous Corals, illustrated every stage in the life-history of each species, and, showing how even so-called genera shaded off into each other, were most interesting, and proved a "nut" for the evolutionists. Not less interesting were the Labyrinthodont remains brought by Dr. Fritsch from Bohemia, and about which he read a paper. These Labyrinthodonts are supposed to be of Permian age, and are so abundant and well preserved that they will throw great light on an obscure but important group of animals. Dr. Roemer sent some specimens of fossils found in the carboniferous limestone of Sumatra, which were striking like those met with in this country. Mr. Charles W. Peach exhibited fine specimens of *Sphenopteris affinis*, showing the complete circinate vernation from the earliest to the latest stages. It was proved that several so-called species had been manufactured from one or another of these transitory stages. Dr. Leith Adam's paper on gigantic Tortoises and Elephant remains from the Maltese caverns excited great interest. Some of the fossil elephants, of Miocene age, were not bigger than large dogs, whilst the tortoises were gigantic as compared to the present forms. Dr. J. E. Taylor, F.G.S., read a paper on the "Age, Fauna, and Mode of Occurrence of the Phosphate Deposits in the South of France," in which he described the physical geology of the departments of Lot and Aveyron. The deposits occur on the oolitic limestone in pockets. These pockets, he contended, were open caverns during the early Tertiary epoch, and the phosphates of lime were deposited as stalactites and stalagmites along the walls and floors of the caverns; the rest was filled in with red cave-earth, in which were numerous bones and teeth of eocene and miocene animals, sometimes in great abundance. These, he contended, stamped the age of the deposits, and he thought the phosphates were due to organic agencies. In these deposits a great many "missing links" had been found, especially those of Lemuridæ, and when the animal remains had been thoroughly worked out they would greatly increase our knowledge of the early tertiary animals. Dr. James Croll's paper on the Age of the Earth, as made out from the tidal retardation, was listened to with much attention. Dr. Croll showed that there was a tendency from subaërial denudation to lower the dry land surface at the equator one foot in six thousand years.

THE DISCOVERY OF PLANTS IN THE LOWER OLD RED SANDSTONE OF THE NEIGHBOURHOOD OF CALLANDER.—This is the title of a paper recently read before the Geological Society, by R. L. Jack, Esq., F.G.S., and R. Etheridge, Jun., Esq., F.G.S., of the Geological Survey of Scotland. The authors give an abstract of the various previous references to the existence of remains of land-plants in deposits of Old Red Sandstone age, and mention the following localities in Scotland, in which such remains have recently been discovered by them:—1. Buchanan Castle Quarry, near Drymen; 2. Old Quarry at small reservoir at Kilmahew; 3. Green Burn, Keltie Water; 4. Keltie Water, above Chapelrock; 5. Keltie Water, below Brackland Linns; 6. Quarry at Kames Farm, near Callander; 7. Quarry at Easterhill, near Gartmore; 8. Quarry in Cameron plantation, near Alexandria; 9. Turnpike road at Overballoch, Loch Lomond;—and the localities from which the specimens noticed in this paper were obtained; namely, a quarry 2½ miles from Braendam House, and the south-west corner of Muir plantation, near Callander. The plant-remains are described as being of a very fragmentary nature, and as occurring in the two last-named localities in a deposit consisting of greenish-grey flags and thin-bedded sandstones about 500 feet in thickness, the best specimens being in the sandstone. They present the appearance of elongated flattened stems, about 1 inch wide on the average, sometimes represented only by casts, sometimes by black carbon-

aceous films. They are ornamented with a series of pucker-like depressions when seen from the interior, or with a number of wart-like eminences when viewed externally. The latter are the scars of the points of issue of the vascular bundles passing to the leaves. Along the margins are seen spines or thorn-like projections, which may be the leaves or their bases; these are apparently arranged in spiral rows. Some stems appear to show dichotomous branching. The authors discuss the relationships of these remains with other described Devonian forms, and regard them as most nearly allied to *Psilophyton princeps*, Dawson. They describe the plant with doubt as a species of *Psilophyton*.

"Notes on the Diamond Fields, &c., of South Africa." By E. J. Dunn, Esq.—These notes are intended to serve as additions and corrections to the author's paper read in 1873. Further mining operations at De Beer's show that the "pipes" are more recent than the sheet of dolerite and other intrusive rocks surrounding them. At this mine the only instance of a dyke traversing the "pipe" occurs. Though the rock composing it was too much decomposed to be determined, it was still quite distinct. As the mines are worked out they disclose a form less circular than at first supposed. The first effect of the disruptive force was to cause a rent in the rocks, the sides of which were afterwards torn away in the weaker parts by the intrusive rock until the present form resulted. The "cores or pipes" have decomposed downwards, being darker coloured and less decomposed at 80 or 100 feet from the surface and towards the centres. Several small freshwater shells were discovered in Kimberley Mine, in an apparently undisturbed deposit. Gold is mined for at Leydenburg and Eersteling, in the Transvaal Republic. The rocks in which it occurs are generally barren-looking, and vary very much in strike. The alluvial gold at Leydenburg has doubtless been supplied from two distinct sources; it is coarse and nuggety as a rule, well rounded, and generally coated with oxide of iron. Lumps up to 10 lb. weight have been found; it is of good quality, worth from 76 fr. to 80 fr. per oz. The auriferous rocks at Eersteling are steatitic and chloritic schist resting on gneiss, and overlain by rocks which at Leydenburg are auriferous. Cobalt is found near Oliphant River, in fine-grained felsite rocks. It does not occur in lodes, but in small threads and lenticular veins, running parallel to a dyke of fine-grained dolerite. The widest vein of ore was 8 inches thick. More than 100 tons of ore have been sent to London.

"The crystalline lens of the eye, which is soft in quadrupeds and cartilaginous in fishes, is very solid in the cephalopoda."

NOTES AND QUERIES.

A Tame Cuckoo.—A fortnight ago a friend sent me a young cuckoo, which he said would be from two to three months old. It appeared very healthy, and fully feathered, with the exception of the tail, which was short. I kept it in a cage several days, and then sent it by my brother-in-law right away into the country to be liberated. The farm-house where he resides stands alone in the fields, having a small wood about 150 yards distant. Directly he arrived at home, he at once went to the wood and liberated the bird, and then returned to the house; but in less than half an hour afterwards, to the surprise of all, the bird flew through the open doorway into the kitchen, and would not leave. It fed itself by picking up crumbs or anything that fell in its way, and finished by giving up the ghost on the fourth day.—*J. B. P.*

The Cuckoo's Eggs.—Mr. Taylor is not singular in the opinion that the cuckoo has the power of laying eggs similar in colour to those of the species in whose nest she lays. In 1853, Dr. Baldamus published a paper, in which he maintained that the eggs of the cuckoo partake of the colour of the foster parents. However, this opinion has not been confirmed by subsequent investigation, and it has been found that the eggs of the cuckoo vary less in colour than those of most other birds of passage. Birds have little discrimination as to the colour or character of their eggs, and the barn-door fowl will sit on chalk eggs, duck eggs, pheasant, partridge, guinea fowl, or even goose eggs, as I have seen the latter frequently hatched by a hen. I dare say the same will apply to any other fowls. Many years ago I observed a magpie's nest in an ash-tree; I removed her eggs, and substituted those of a barn-door fowl, which were duly hatched by the magpie, and the chicks were afterwards removed by me, and reared without difficulty. Although the eggs of the cuckoo may be deposited in the nests of all the kinds mentioned by Mr. J. S. Copeman, yet the nest of the Meadow Pipit appears to be its favourite, at least in the north of England, as more than half the number of the eggs are found in the nest of this species. Some of the nests in which the eggs of the cuckoo are deposited are so small that it is impossible for it to enter; for instance, that of the Willow Wren whose nest, is domed, and the entrance at the side so small as to be just of sufficient size to permit the wren to pass in and out. Dr. Jenner mentions a case, in Montagu's "Ornithological Dictionary," of a cuckoo's egg being found in a Wagtail's nest, in a hole under the eaves of a cottage, in which the difficulty is just as great as in the case of the eggs in the Willow Wren's nest. Now, the question arises how are the cuckoo's eggs deposited in nests where it is quite impossible for that bird to enter? The naturalist Vaillant obtained pretty satisfactory evidence that one at least of the African cuckoos carries the eggs in her bill. It is therefore evident that such must be the case with our European species. When the egg of the cuckoo is deposited in the nest of another bird, it always happens that the young of the foster parents are thrown out a day or two after they are hatched; and the cuckoo being at that period quite naked and without even down upon it, one would naturally suppose that it had not the power to accomplish such a feat. Yet such appears to be the case. Dr. Jenner published an account of this per-

formance in the "Philosophical Transactions" for 1788, and this has been recently confirmed by a letter in *Nature* on the 14th of May, 1872, by J. B., author of "Caw, Caw," who witnessed the transaction. This has been still further confirmed by Mr. John Hancock, of Newcastle, who says, "On the 6th of June, 1864, I observed a nest of the Hedge Accentor, which contained five eggs, four belonging to this bird and one to the cuckoo. I visited the nest again on the 8th of June, and found three young accentors and the cuckoo hatched, one of the hedge accentor's eggs having disappeared; the three young hedge accentors lay on one side of the nest, the other, the cuckoo, by itself. On the morning of the following day, I once more went to the nest; the three accentors were gone, and the cuckoo was the sole occupant. One of the accentors lay dead on the ground below the nest. On the 10th of June I saw the foster parents feeding the cuckoo."—*Dipton Burn.*

Cuckoos and their Eggs.—Mr. Copeman will find, on further investigation, that Dr. J. E. Taylor's account of the various colour of cuckoos' eggs, given in his most interesting "Half-hours in the Green Lanes," is borne out by other naturalists of high repute. If he will turn to *Chambers's Journal* for May, he will there meet with the following paragraph:—"In 1853 Dr. Baldamus, of Stuttgart, published a series of interesting observations on the egg-laying peculiarities of this singular bird. He attempts to prove, and with considerable success, that the egg of the cuckoo *agrees in colour with those amongst which it is placed.* That she can voluntarily influence the colour of her eggs. He enumerates the nests of thirty-seven species—to which list the editor of the *Ibis* has added fifteen—frequented by the cuckoo. There is certainly a very marked resemblance in many instances between the egg of the cuckoo and those of the species whose nest is selected, though there are notable exceptions, such as that of the hedge-sparrow, whose blue-green eggs bear no resemblance to the colour of *any* egg laid by the cuckoo. In this case, however, it may be that the hedge-sparrow is one of those species more easily duped than others, so that the deception of colour is not necessary."—*James Rogers, Bolton.*

Cuckoos' Eggs.—Mr. Copeman will find an article in Science-Gossip for May, 1870, written by Mr. J. E. Harting, on the cuckoo, in which Mr. Harting refers to a discovery by Dr. Baldamus, that hen cuckoos are endowed with the faculty of laying eggs similar in colour to those of the species in whose nests she lays, in order that they may be less detected by the foster-parents. This is corroborative of the statement made by Mr. Taylor in his "Half-hours in the Green Lanes."—*R. Christie.*

How to destroy Clothes-Moths.—In reply to the query of W. Benn in a recent number, I beg to recommend him the following plan for the destruction of the larvæ of moths infesting woollen goods. Take a coarse towel or cloth, and wet it thoroughly; fold it to three or four thicknesses, and lay it on the part suspected, and pass over it a *very hot* iron. The steam generated kills the larvæ and cooks the eggs. I have tried it on a couch and carpet that were much infested with entire success, and have not found it damage either the carpet or the green wool rep cover of the couch.—*J. S. L.*

Decay of Trees.—Some remarks in Science-Gossip for August call attention to the decay of trees in Hyde Park, and it is stated there how the leaves and fruits of these trees have been carefully swept away from year to year without substituting any manures in their place. What suicidal policy! for by this means the very food of the plant has been taken away from it. It might have occurred to some one before that each tree must naturally drain up all the available nutrition in a given area if no more were added, and that supplied by nature were persistently swept away as it fell. As an evidence of how much nutrition there is in the decaying leaves, &c., I will quote the tables of Professor Wolff, and give a few of his analyses. First, then, in "fruits and seeds of trees":—

	Potash.	Soda.	Magnesia.	Lime.	Phosphoric Pentoxide.	Sulphuric Trioxide.	Silica.	Chlorine.
Horse-chestnut	58·9	..	0·5	11·6	22·4	1·4	0·2	6·4
Ditto, green husk..	76·4	..	1·0	10·0	6·3	1·4	0·6	5·6
Acorns..............	64·5	0·7	5·4	7·0	16·2	2·8	1·1	1·7
Beech Mast	22 8	10·0	11·6	24·5	20·8	2·2	1·9	0·5

Also the following leaves:—

	Potash.	Soda.	Magnesia.	Lime.	Phosphoric Pentoxide.	Sulphuric Trioxide.	Silica.	Chlorine.
Horse-chest. (Spring)	38·8	..	3·9	21·3	23·4	6·0	2·9	3·8
Ditto (Autumn	19·6	..	7·8	40·5	8·2	1·7	13·9	4·1
Beech (Summer)	18·5	1·8	8·6	36·5	7·8	3·1	15·2	1·2
Ditto (Autumn)	5·2	0·6	6·0	44·9	4·2	3·7	33·9	0·4
Oak (Summer)	33·1	..	13·5	26·1	12·2	2·7	4·4	0·1
Ditto (Autumn)	3·5	0·6	4·0	48·6	8·1	4·4	30·9	..
Scotch Fir (Autumn)	10·1	..	9·9	41·4	16.4	4·4	13·1	4·4
Spruce ditto	1·5	..	2·3	15·2	8·2	2·8	77·1	..

It is obvious from these tables what a constant supply of nutritious material there is in fallen leaves and fruits, which are as beneficial as a manure; for these decaying and liberating their salts, which become dissolved in the water of the soil, become a constant source of nutrition for the plant. So that whether in the form of raphides or sphæraphides (as Science-Gossip says), it does not matter very much, whether as double phosphates of calcium and magnesium (as in globoids), or as calcium carbonate (as in cystoliths), still the ultimate analysis of the leaves shows us how much real food there is contained in them, and how essential it is to allow them to decay on the ground, or else supply their place by suitable manure. We have only need to point to the luxuriant vegetation found in woods where the leaves are thick on the ground as a proof of this. Every one of your readers will have some recollection of a beautiful, damp, moist glen or dell, inches thick in decaying and decayed leaves, and in which cryptogamic vegetation is luxuriant, and the large trees are always green and healthy; and evidently this is because Nature supplies her own manure, and the broom of civilization is not there to sweep it away, and make clean at the expense of life. I may add that these tables are quoted from Professor Johnson's "How Crops Grow."—*R. N. W.*

Density of Sea Water.—Perhaps some of your readers can enlighten me in regard to the following: in Professor (now Sir) Wyville Thomson's "Depths of the Sea," on page 304 is the following statement:—"It has been shown by

M. Despretz, as the result of a series of carefully-conducted experiments, which have since been frequently repeated and verified, that sea water, as a saline solution, contracts and increases steadily in density down to its freezing-point, which is, when kept perfectly still, about 3° 67′ C. (25° 4′ Fah.), and when agitated, 2° 55′ C." From this latter statement it appears that it takes less cold to freeze water when agitated than when perfectly still. I had always supposed the reverse to be the case.—*J. F. James, Cincinnati, O., U.S.A.*

Local Names.—Since you are opening your columns to the derivations of local names, may I ask that of "Clevel"—as a clevel of wheat? The word is well known in this part of the country, as meaning the corn itself, but I can find no mention of it in books of reference, so suppose it is a local term. If any of your numerous readers can tell me its origin I shall feel much obliged.—*Brian Rigden, Canterbury.*

Colias Edusa. — With reference to what "J. R. S. C." says respecting this insect, I have myself noticed how common it is some seasons in certain localities; and I remember with what pleasure I once came across a lucerne field in Wiltshire over which numbers of this beautiful insect were flying; they were, in fact, commoner in this spot than any other butterfly, and from what I have noticed I should say that they decidedly do not hybernate, but may be met with (generally very much worn) as late or later in the autumn than any other of our butterflies.—*Ed. Lovett.*

Crawfish.—I have just had some of these fresh-water crustaceæ brought me from Wiltshire, where they are caught in great numbers in some seasons by means of small nets stretched on iron hoops and baited with a piece of liver, or even a minnow. As I wished to preserve some of them, and thinking to keep them alive a short time, I put them into water, but in a few hours they nearly all died: so I placed the survivors in a *dry* vessel, with stinging-nettles, which, I have heard, keeps them alive, and, strange to say, although I have had them now over a week, they are as fresh and lively as when first caught: how is this to be accounted for?—*Ed. Lovett.*

Herring Gull.—A herring gull belonging to Miss Ross, Limavady, was taken from the nest in 1832, which makes the bird 44 years old,—a rather patriarchal age for a gull.—*S. A. Brenan, Cloughban, Pomeroy.*

A Group of Answers.—I have ventured to answer a few queries which I observed in Science-Gossip, the answers to which have not yet appeared. I should have done so before, but thought some of your older correspondents would do so. First, then, "A. J. A.," writing from Brisbane, mentions a very interesting example of the sudden appearance of plants, at page 162. No doubt, Mr. Lees is quite capable of taking his own part, but to me the following seems to be an explanation of the facts. In speaking of the soil, he says it is formed "from the dropping of the leaves of many centuries." Now the explanation appears to be this:—The fire having burnt the semi-decayed leaves, leaves the subsoil, rich in seeds, exposed to heat, light, and moisture; these seeds being thus placed under circumstances favourable for germination, vegetate and produce plants, whose seeds may have been buried for years. 2. On page 118 there is a query as to whether geese ever eat *Galium Aparine.* A letter on page 166 throws no light on it. Now, although I have never seen geese eat it from choice, yet in this part of Surrey, in confinement, they are commonly fed with it, and they take to it readily; but this may be a local custom, and, if so, would scarcely account for the widespread use of the name "goose grass." 3. On page 167 is a letter concerning the phosphorescence of centipedes. I have several times seen them leave a long trail of phosphorescent light behind them, themselves appearing luminous at the time; but as I never killed them, I cannot say whether they would continue to do so after death. The fact of their emitting a light seems well established. At page 509 of Kirby and Spence's "Entomology" is a description of the light emitted from *Geophilus electricus*, and undoubtedly the myriapod in question was of that species. 4. At page 167 is a letter relating to the scarcity of the Hawfinch. It must be that it is not so scarce here as in other parts, for I generally see one or more every year in my immediate neighbourhood. On Horsley downs, and about Clauden, I have known four and five to be shot in a day, many of which have been sent to me; and it is not uncommon about here to see one in cases of stuffed birds. A neighbour of mine also kept one for many years in his aviary.—*W. H. Gaze.*

Double Eggs.—I had a very remarkable specimen of a double egg of the Hedge Accentor (*A. modularis*) brought to me in May last. I have called it a double egg, but in reality it was two eggs joined together transversely, with no internal connection between the two. Each egg contained the yolk and albumen. The query is as to whether the bird had laid the two eggs in that state, the eggs being quite firmly joined, or whether the eggs had been laid in the nest in a soft state and afterwards united? I should be pleased to know if any of your readers have met with similar specimens, and how they can be accounted for?—*C. D. Wolstenholme.*

Deer and Snakes.—A friend of mine living in the country, a keen observer in natural history, noticed a number of deer in the Park at Castle Howard following each other in single file in a circle, and on coming to a particular place they in turns jumped. After watching them a few minutes, and wondering at their unusual movements, he went up and found a large snake (*Coluber natrix*), quite dead and perfectly flattened, having been jumped upon by all the animals in turn, who had evidently killed it knowing it to be an enemy.—*C. D. Wolstenholme.*

Midges.—What are midges? In what division of the insect world are they classified? Are they the same as what are sometimes called *thunderflies?* During the late sultry weather (notably on the 7th and 8th August) there was an irruption of them in the south-east of Kent.—*C. H.*

Drying Ferns, &c.—There is a method of drying leaves and ferns (so as to retain their natural appearance) in blotting-paper. What chemical is used on the blotting-paper, and what varnish?—*E. M. P.*

The Swallow-tailed Butterfly.—This butterfly need not be looked for in Kent. Newman, in his work, says "Kent." At p. 159 of the fourth volume of the "Entomologist," Mr. W. C. Hammond writes thus in October, 1868:—"A young lady

a near neighbour of mine, this summer took Machaon in a clover field. I believe the chrysalis of Machaon was put down in some numbers experimentally a few years back. These marshes are some eight miles off. Is it possible this was one? A single specimen was taken thirty years ago by my brother."—*J. S. Wesley.*

Woodlice.—I would inform "Querist," that the best mode of exterminating woodlice is to sprinkle chloride of lime over the parts infested with them.—*R. N. W.*

Skeletonizing of Starfish.—Can any of your readers give me some definite rules as to the mode to be adopted to skeletonize the common Five-finger, or the Solaster or Sun-star? I have repeatedly tried, and only once have I been successful; yet I could never discover the reason of my success in the one case or my failure in the others. The method I used was to soak the starfish in a solution of liq. potassæ and water, and then wash away in clear water the parts which had been destroyed by the potassa; but sometimes the starfish crumbled to pieces after a very short immersion, and at another it would resist for a much longer period the action of the solution of potassa. Sometimes all would seem to be going on quite nicely, and then the washing away of the last piece of destroyed skin would reduce the whole to a mass of fragments. What I want to know is the strength of the solution of potassa and water I ought to use, the time of immersion, and the means I ought to adopt to cleanse the specimen. Perhaps Mr. Sharpe, who used to be a contributor, and who, I know, has had experience in the matter, would kindly give me the result of his experience.—*Frederick Stanley, Margate.*

Fuchsias.—While selecting plants for an annual flower-show in the district of St. Barnabas, I met with a magnificent fuchsia over 5 feet high and 3 wide, with some of the leaves 3 and 3½ inches across. The owner is a most respectable man, and known to me for years. I can therefore vouch for his truthfulness. He tells me that his fuchsia has never been watered since he had it as a cutting with anything but cold tea, and that now it has half a pint of good cold tea regularly every day. Inquiring in other rooms, I found that several people had taken the hint, and watered their plants also with cold tea, and all said to be so watered were extremely good. Our judges were two gardeners, and they awarded the first prize to the fuchsia described above. Will you allow this to be inserted in Science-Gossip, with the inquiry among your scientific readers as to what are the properties of tea that make it suit fuchsias and geraniums so well, and also if its use is generally known?—*Emily W. Rutch.*

Sparrowhawk and Crow.—One morning, on coming down-stairs, I noticed that the pigeons which live in a hole in the spire of the church were flying about in a very frightened manner. On going up to the churchyard gate, I found the cause of the commotion to be a large sparrowhawk, which was clinging to the spire. It hung for some time, until at last an unwary pigeon came near, at which it dashed, but which by some accident it missed; it retired to the spire again, where it stayed for some time, but as the pigeons would not come near, it made several long and unsuccessful dashes at them. During one of these dashes a crow (*Corvus corone*) appeared on the scene, which, in its turn, dashed at the sparrowhawk, pulled some feathers out of its back, and drove it off to a large tree, upon which they both sat for some moments. Suddenly the sparrowhawk made a dash at one of the pigeons, which was sitting on the church roof, but missed it, and then flew away at a great pace, followed by the crow, which did not leave it as long as they were in sight. A few days after, the same hawk again visited the church in the middle of the day, but as the pigeons were out in the fields feeding, it sailed round three or four times and departed. The only thing noticeable about the sparrowhawk was its small size. I told our gardener what I had seen, and he told me the following anecdote about a sparrowhawk and weasel (*Mustela vulgaris*). One day, as he was walking through a field just cleared of stacks of corn, he saw a sparrowhawk fighting with some creature; he ran towards the spot, upon which the hawk rose high up into the air, carrying a weasel with it, which it let fall when a great height up. On picking up the weasel, he found it was quite dead, with its back broken, and the sparrowhawk, which had been slowly flying away, suddenly reeled, and fell "stone" dead. The sparrowhawk must have pounced upon the weasel by mistake, which must, in its turn, have bitten and sucked it. The man did not notice if the bird was much injured by the conflict, but it must have been, or it would not have fallen. What do the readers of Science-Gossip think of these *facts?—A. P.*

Spiders uttering Sound.—I can inform "H. F." Jun. that I have heard spiders emit the peculiar sounds which he describes. Some years ago I kept a number of garden spiders in a large bottle for several days, feeding them on house-flies. Whilst in confinement, I repeatedly heard them make a kind of ticking sound, very similar to that of a watch, but at irregular and much longer intervals. Though I examined them very minutely whilst uttering this sound, I observed nothing which could indicate how they produced it.—*G. M. Doe, Torrington.*

BOOKS, &c., RECEIVED.

"Field Geology." By W. H. Penning. London: Baillière & Co.

"Sound in its Relation to Music." By Prof. Blaserna. London: H. S. King & Co.

"Resources: a Treatise on Water and Springs." Written by Bernard Palissy. Brighton: W. J. Smith.

"The Sanitary Record." September.

"Monthly Microscopical Journal." September.

"Land and Water." September.

"Ben Brierley's Journal." September.

"American Naturalist." August.

"Canadian Entomologist." August.

"Botanische Zeitung." August.

"Les Mondes." August.

&c. &c. &c.

Communications received up to 12th inst. from:—C. B. P.—J. F. J.—F. C.—M. M.—J. B.—T. S. R.—W. K. M.—G. T. C.—F. J. R.—C. D. W.—Mrs. G.—W. E.—W. H. G.—R. N. W.—W. J.—C. W. B.—J. B. P.—D. B.—M. G.—H. E. W.—C. H.—G. L.—R. B.—H. L.—W. L.—R. J. S.—J. S. L.—J. R. S. C.—G. C. D.—J. S. W.—J. G. H.—G. E. L.—H. E. W.—E. E.—R. D.—J. H. G.—W. H.—R. T.—Dr. T.—E. F. G.—E. W. W.—S. A. B.—F. J. R.—T. W.—A. P.—H. G. G.—G. P.—Dr. P. Q. K.—J. H. B.—J. T.—E. M. M.—W. H. G.—W. W. S.—G. W.—F. R.—E. L.—R. R.—B. R.—G. D.—G. R. V.—R. H. M.—W. R. W.—E. G. H.—I. C. T.—M. F.—H. B.—C. W. C.—Dr. T.—T. B. L.—T. E. W.—H. L.—H. J. Mc G.—W. T.—Prof. L.—G. R. V.—J. O.—S. B. jun.—R. E. L.—W. H. D.—J. H. L.—E. L.—W. L.—F. H. A.—G. W. C.—G. H. P.—C. W. C.—J. L. C.—J. W. P.—H. C. C.—W. F.—H. W.—C. V. G.—Prof. G. S. B.—A. G.—J. B.—G. N.—T. D. R.—J. B. B.—W. J. H.—W. K.—W. M. R.—E. B. T.—J. R.—Dr. W. J. D.—A. H.—C. H. S.—Dr. H. W. L.—Prof. B.—Y. Z.—F. L. C. R.—W. A. H.—R. N. jun.—J. L.—C. V. S.—W. A.—T. Mc G.—J. W.—A. B.—&c., &c.

NOTICES TO CORRESPONDENTS.

To Correspondents.—It is necessary for us to request some of our correspondents, who use this and the Exchange column, to favour us with as clear and distinct handwriting as possible. Many mistakes are constantly occurring, and no end of trouble is given, by the hurried and careless penmanship of some of our correspondents.

N. N. H.—The foci of the lenses in the *Huyghenian* eyepiece are, as near as possible, the same as those in Ross's *C. ocular;* the aperture of the diaphragm is exactly $\frac{1}{24}$ of an inch; the eye lens is flush with the aperture on the cap.

F. C.—The work you mention has no value as a Natural History, except to those who like to trace the advances which have been made in that science since the publication of your book. You can obtain through a bookseller the information you require respecting the hook you name.

C. W. Bingham.—The insect was an *Ichneumon*, but we cannot, from the description sent, identify the species.

Oneida.—The larger leaf is very curious: they are most likely perforated by the larva of some insect, but what it is impossible to say.

J. H. Green.—Do not know of any other than Walker's: why not go regularly in for this neglected order? The difficulty of the technicalities soon disappears, and workers are sadly wanted.

E. G. Hebbert.—Your specimens from Keswick are tbe seedlings of the Maiden-hair Spleenwort fern (*Asplenium trichomanes*).

Foreign Beetles.—We cannot undertake to name foreign beetles or other insects.

Double Staining Vegetable Tissues.—In the last paper by Dr. Beatty on this interesting subject, the following errata occurred:—Page 98, "to absolute alcohol for ten hours," should read "two" hours; page 99, 2nd column, six lines from top, for "rapidly" read "slowly"; page 100, should read "the blade is $7\frac{1}{2}$ in. long by $1\frac{1}{4}$ in. wide." Perhaps the magazines and journals which copied Dr. Beatty's paper *verbatim*, without acknowledging its source, will kindly note the above corrections.

Dr. T.—The insect is the Great Saw-fly (*Sirex gigas*). See "Half-Hours in the Green Lanes," page 201.

J. B. Bradley.—Your specimens are *Salvia verbenaca*, or "Clary"; and *Lotus corniculatus*, or "Bird's-foot Trefoil."

Dr. W. J. D.—Please send us male and female specimens of the "Tape-worm" for identification. Shall be glad of any notes anent "Illumination." Send slides to 192, Piccadilly.

A Subscriber from the First.—Get Morris's "British Birds." Yarrell's will soon be out, edited by Prof. Newton.

W. Narracott and Others.—We do not undertake to return rejected MSS. Part of W. N.'s communication appeared two months ago.

W. F. (Olney).—No. 1 is the Bur Marigold (*Bidens cernua*); No. 2 is the Biting Persicaria (*Polygonum Persicaria*).

J. Butterworth.—Thanks for the slides.

T. B. L.—By all means procure Llewellyn Jewitt's "Half-Hours with Antiquities," which will shortly be published at 192, Piccadilly. For details as to archæology, churches, &c., consult the "Dictionary of Terms of Art, &c.," published as one of Weale's series.

G. R. Vine.—Your excellent slides of sections of Coal Plants safely to hand. Accept our best thanks for them. Article temporarily deferred for want of space.

S. B., jun.—Cut your thistles down early in the year, before they flower and seed.

Middleton.—A correspondent from this place sends us an exchange, but does not give his name.

Dr. E. F. T.—The fungus was undoubtedly that causing the dry-rot in wood.

H. J. McGill.—Your specimen appears to he a variety of *Polygonum aviculare*, but there was not enough of it to decide from.

W. James.—For instructions as to making sections of coal, see Science-Gossip for 1872, page 87.

W. James (Whitby).—The fungus on the leaf is *Stegia ilicis;* that on grasses Nos. 1 & 2 is *Trichobasis rubigo-vera.* The specimens are too minute fragments to send for identification, especially when the fungi are so common that half a dozen leaves might have been sent.

R. D. (Newcastle-on-Tyne).—Your grass is a dwarfed example of *Kœleria cristata*, Pers.

G. Horn.—No. 1 is *Carex curta*, Good.; No. 2, *Carex dioica;* No. 3, *Caltha palustris:* we never met with so small a specimen of this species: it may probably arise from the locality; No. 4, *Sagina saxatilis* (marked No. 1); No. 5, *Sagina nivalis*, Lind.: the latter is a very great rarity, and has been found by very few British botanists; we believe Prof. Balfour was the first who detected it in Britain, only about five years since.

F. H. A. (Chichester).—Your specimen is, we believe, *Ranunculus trichophyllus*, Chaix: in the absence of fruit, it is difficult to form an opinion. *R. diversifolius* included what we now credit as nearly a dozen distinct species.

T. H. (Bridport).—Horseradish (*Armoracia rusticana*, L.).

D. E. J. (St. David's).—The plants are: No. 1, a young Sedum, too young to determine; No. 2, Wall Pepper (*Sedum acre*, L.), a common though elegant species; No. 3, Sun Spurge (*Euphorbia helioscopia*, L.); No. 4, Male Fern (*Lastrea Filix-mas*). Our correspondent should always send perfect specimens.

EXCHANGES.

Wanted in exchange for good Microscopic Slides, one or two dried specimens of *Hierochloe borealis* (the Holy-grass) for herbarium. Will send list of slides to select from.—G. Garrett, Harland House, Wherstead-road, Ipswich.

Duplicates.—*H. nectus, E. Jacobœa, S. dispar, D. gonostigma, D. potatoria, U. sambucata, T. crepuscularia, P. cytisaria, H. thymaria, A. aversata, Ulmata, M. ocellata, M. subtristata, C. silaceata,* E. Cat. Desiderata:—Larvæ, Pupæ. and Imagos.—W. K. Mann, Granby House, Clifton, Bristol.

Hypnum nitens in fruit, and other Mosses, in exchange for Mosses, Plants, &c.—Robert Renton, Threeburnford, Lauder, N.B.

Rare British Plants, for Butterflies or the larger Moths.—L. R. H., 4, Ellesmere Villas, Devonshire-road, Forest Hill.

Wanted.—Specimens of *Glyphipteryx thrasonella, G. equitella, P. Paris,* for Good Slides.—M. Fowler, 20 Burn-row, Slamannan, N.B.

For prepared Scales of Rack Fish, send a stamped directed envelope to W. H. Gomm, Somerton, Somerset.

Duplicates.—*Sibylla, Paphia, Adippe, Artemis, Selene, Lucina, Aegon, Alsus, Corydon, Tages, Alveolus, Galathea, Phleas,* and *Jacobæ* (pupæ).—R. J. Stent, 70, Queen-street, Portsea, Hants.

Mounted Sections of Fossil Vegetable Tissues from the Lancashire coal-measures in exchange for good Mounted Objects.—J. Butterworth, Goats Shaw, Oldham.

Foreign Butterflies and Seeds from Peru, Madagascar, and the West Indies, for Micro-slides or Useful Offers.—A.G., 18, Elgin-road, St. Peter's Park, London, W.

Wanted, Rock Specimens (in quantity) from known localities. Good exchange given in British or Foreign Recent Shells, Fossils, Minerals, Crustacea, &c.—Thos. D. Russell, 48, Essex-street, Strand, London, W.C.

Wanted, slightly-injured Specimens of Exotic Lepidoptera for microscope dissection. Will give in exchange Microscope Slides.—W. A. Hyslop, 22, Palmerston-place, Edinburgh.

Black Rats (English), neatly preserved in the skins, for Rare Birds' Skins or Mammals' Skulls.—R. Morton Middleton, jun., Fountain House, West Hartlepool.

Aglaia, Atalanta, Artaxerxes, Alsus, Hectus, Velleda, Humuli, Fuliginosa, Piniaria, Chœrophyllata, Bucephala, and Iota, for other Insects.—John Rae, Hanover-street, Aberdeen.

Pleistocene Shells from Erith and Crayford in exchange for Tertiary Fossils, either English or foreign.—Robert Nuttall, jun., 14, Westbourne-park-terrace, Harrow-road, London.

Hairs of Rat and Mouse and Pollen of Common Club-moss in exchange for other Objects of Interest.—Jos. Laing, 126, West-street, Crewe.

Wanted, Living Desmids in exchange for Mounted Specimens which will retain their colour. Any genera except Closterium.—Communicate with Charles Vance-Smith, Old Chapel Parsonage, Dukinfield, near Manchester.

Slides of *Amphipleura pellucida* in exchange for other Well-mounted Test-slides.—W. J. Dickson, M.D., Canonbury, Falkland, Fifeshire.

Duplicates of Irish Marine Algæ, including *Bryopsis hypnoides*, fruited *Griffithsias*, and other interesting Herbarium Specimens. Wanted, other Rarities, or first-class Slides, or anything good.—T. McGann, Burren, co. Clare.

Duplicates.—*Edusa, Galathea, T. W. album, Cred. Io, Adonis, Corydon, Agrestis, Tages, H. cornua,* and *A. Sonicere.* Desiderata.—Pupæ of *Machaon*, Imagos *Cratægi, Sinapis, Blondina, Davus, Cinxia,* and *Egœou.*—Joseph Ovenden, 42, Temple-street, Strood, Kent.

A few foreign Fern Fronds for other species.—Mr. Cox, 92, Denmark-street, Camberwell, S.E.

Nos. 82, 132, 135, 140, 150, 163, 259, 363, 578, 668, 729, 893, 974, 1,043, 1,253, 1,257, 1,268, 1,296, Lon. Cat., 7th edit., offered for Nos. 2, 10, 45, 81, 92, 122, 123, 133, 253, 255, 261, 304, 325, 334, 388, 396, 575, 577.—J. W. Pickering, the Cottage, Sparkbrook, Birmingham.

Polygonum Raii, Sclerochloa foliacea, Triticum pungens, &c., for other species.—J. Harbord Lewis, 180, Mill-street, Liverpool, S.

Offered.—*Utricularia neglecta* in flower for *Utricularia intermedia* or *Zunichellia polycarpa*, either living or dry, or living plants only of *Myriophyllum verticillatum* or *Hippurus vulgaris.*—W. Curnon, Pembroke College, Newly Cliff, Penzance.

Offered.—865, 576, 558, 829, 831, and others, in exchange for Rare British Plants.—W. J. Hannan, 6, Tatton-street, Ashton-under-Lyne.

A GOSSIP ABOUT NEW BOOKS.

IN spite of the "dulness" which has characterized the book world for the last few months, we cannot complain of sterility. Several scientific works have been issued, and others will be shortly forthcoming, which will make their mark and help on still further the progress of natural science. The "Rambles of a Naturalist in Egypt and other Countries," by J. H. Gurney, jun. (London: Jarrold & Sons), is the production of a genuine, ardent naturalist, the worthy son of a worthy sire. It is almost a pity that the title of this attractive and interesting volume is the same as that of Quatrefages, translated by Dr. Lawson, and given to the English reading world many years ago with the same title that Mr. Gurney has now adopted. This is the only fault we have to find with the present work. The narrative part is related with a vivacity which shows what a vivid impression the scenes amid which the author passed made on his mind. The style is simple, picturesque, and terse. The detailed account of his six months' bird-collecting will prove valuable to every ornithologist, as noting the geographical distribution of many forms familiar to English students. The book also contains a clever analysis of the claims of certain foreign birds to be considered British. The material contained in it has taken six years to collect, and the author expresses a hope that his book may help to render ornithology more popular. We are of opinion that this modest hope will be abundantly satisfied, and that its young but accomplished author will receive all the credit he so richly deserves.

"Field Geology," by W. H. Penning, F.G.S. (London: Baillière & Co.), is a book that fills up a gap. We have no lack of general and popular geological manuals, which give full and accurate theoretical outlines of the stony science; but here is a book fresh from the field, written by a field-geologist, which tells the student how to do out-door work, such as mapping strata, taking sections determining the kinds of rocks, &c. It is profusely illustrated with the diagrams necessary to make this understandable; whilst its value as a practical work is enhanced by the chapters on "Palæontology" by Mr. A. J. Jukes-Brown, in which the student will find drawn up lists of the characteristic fossils of each formation, and of the important subdivisions of formations. The fullest details are given concerning field geology and the way to proceed in discovering the various kinds of rocks. Mr. Penning has placed all real students of field geology under a great obligation.

At this juncture, when "spiritualism" is making such claims to be considered as a science without submitting to the treatment which genuine sciences gladly undergo, the publication of the fourth edition of Dr. Carpenter's "Principles of Mental Physiology" (London: H. S. King & Co.) is exceedingly timely. Undoubtedly many of the phenomena which spiritualism claims as peculiarly its own, such as clairvoyance, mesmerism, and the like, belong to the domain of mental physiology; and the student who desires to study them after the inductive method, will be both satisfied and delighted with the manner in which Dr. Carpenter has discussed them in this most readable volume.

From the same active firm (Messrs. H. S. King & Co.), we have also received Mr. R. H. Scott's "Weather Charts and Storm Warnings," and Dr. Blasema's "Theory of Sound in its relation to

Music.' The former is the work of the best meteorologist of our day, and may be regarded as a modern manual of the weather system." Now that our daily newspapers give "weather charts" as part of their information, a work which explains them cannot fail to be acceptable. Moreover, as Mr. Scott remarks, the conceptions and principles on which the science of weather-study is based are apparently quite new to the majority of ordinary readers. We regard this little book as a synopsis of weather knowledge. It is profusely illustrated with charts, &c., and it is hoped it may partly remove our great ignorance of the meteorological laws which affect the main topic of an Englishman's conversation—the weather! Dr. Blasema's book is one of the well-known "International Scientific Series." In it the author endeavours to bring together two subjects, "sound" and "music," which are usually treated of separately. So far, therefore, it is a boon to the general reader, for students of physics do not usually enter into that of musical arrangements, and on the other hand, musicians rarely even understand the importance of the physical laws of sound. To lovers of science as well as lovers of musical art, therefore, this volume will be welcome.

"The Crimea and Trans-Caucasia," by Commander J. Buchan Telfer (London: H. S. King & Co.), is a well-got-up, attractive, illustrated work, in two volumes, narrating the author's journey in the Kourban, Gouria, Georgia, Armenia, Ossetz, Imeritia, Swannetz, and Mingrelia, in the Tauric range. Now that public interest is directed towards a quarter of the globe where our Crimean campaign was carried on, an extra interest surrounds this book. The historical and archæological descriptions of places visited by the author are well written, and a new area of travel is opened up to those who have done the whole distance from Dan to Beersheba. It is a most interesting and vivacious work, and the best praise we can award the author is that he was fully equal to the important task he set himself to do. We are not surprised, therefore, that as a book of travels in a country at no great travelling distance from our shores, it has been so favourably received.

"The Annual Record of Science and Industry for 1875," is edited by Mr. Spencer F. Baird, and published in England by Trübner & Co. Although giving full place to all the notable discoveries, and principal papers, &c., read on science in Great Britain and Europe generally during the year 1875, this volume will be chiefly acceptable to English men of science for the fuller outlines of similar work done in the United States. In this respect its value is very great. We have our own "Zoological" and "Geological Records," and in some sense the volume before us undertakes the same kind of work more broadly and popularly—perhaps more after the style of the late Mr. Timbs's "Year Books." The classification is good, the index ample, and the work undertaken by the editor and his associates well carried out.

ON THE SUDDEN RE-APPEARANCE OF PLANTS ON CLEARED WOODLAND GROUND.

By Edwin Lees, F.L.S., F.G.S.

I OBSERVE that the correspondent who dates from Brisbane, Australia, in a former number of Science-Gossip, wishes me to assign a cause "for the appearance of plants when the ground has not only not been disturbed, but subjected to such intense heat from fire, that *one would suppose* that any life some inches below the surface must become extinct." Now one good observation is worth a dozen theories, and supposition amounts to nothing. The writer referred to then mentions how the forest ground (in Australia) covered for many centuries by the largest trees and shrubs, has made a dense jungle with a thick layer of dropped leaves, which, after the trees and shrubs are burned, is set fire to, and "the smaller wood is entirely consumed." The result is, that no breaking-up of the soil is necessary, for it has become—no doubt by the action of the fire—"quite loose and friable." This it could not have been before the fire, and surely it cannot be truly said that here is no disturbance of the ground. The account given by "A. J. A." of the appearance of a "large crop of wild flowers and plants" on this freshly-exposed ground is very interesting, and I only wish that he had enumerated all the plants that presented themselves to view; for although he says that similar plants were *not apparent* for many miles around, he does not say that any were foreign to the country, and therefore I presume they were all indigenous plants.

As woods are not usually burned down in England, I cannot say what would be the result of a conflagration on British forest-ground; but if a thick layer of leaves covered the soil, I should think that seeds that had lain deep in the soil for many years would not be destroyed thereby. But, at all events, it appears very clear, from numerous instances both in Europe and America, that the growth of a dense forest chokes the plants that once adorned the ground, and their seeds lie dormant in the soil while the shade prevails and the sun is excluded. But as soon as the wood is destroyed and the light let in, then the former vegetation that had long lain dormant *re-appears*. This is shown on a grand scale in North America and Australia; and, what is more curious still, it has been many times stated that, in the densely-wooded parts of the United States, when a pine forest has

been cut down and the stumps of the trees burned, a race of deciduous trees succeeded to the pines. I may instance what M'Gregor has stated in his "British America," that wherever the original forest is destroyed in America, and the land left uncultivated, trees of a different species spring up to what were there before. This is likewise observed *where lands have been laid waste by fire.* The first year tall weeds and raspberry and bramble bushes shoot up; then cherry-trees, white birch, silver firs, and white poplars appear, but seldom any tree of the genus previously growing on the space laid open by the fire. Sir Alexander Mackenzie also observes that the banks of the Slave Lake, in Labrador, formerly covered over wholly with spruce-fir and birch, *having been laid waste by fire*, "produced subsequently nothing but poplars." These records of plants and trees springing up on the ground after woods have been burned down, and the soil undoubtedly subjected to great heat, proves that seeds buried probably some inches deep are not destroyed by the high temperature, and the thick layer of dead leaves would offer some protection, even though the leaves were reduced to ashes.

Some plants rejoice in a high temperature, and it has been stated that after the Great Fire of London in 1666, *Sisymbrium Irio* sprang up abundantly among the ruins, though it is now so rarely to be found that it is considered by Watson as only a "denizen" in Britain.

It may not be inappropriate to notice a few instances of the reappearance of plants in woodland ground after the felling of timber that had shadowed the ground so continuously for many years as utterly to have prevented their growth. White mentions in his "History of Selborne," that part of a steep wood in that parish had been called, traditionally, the "Strawberry Hanger," although no persons then living remembered gathering strawberries there, and no plants were apparent; but, on the wood being cut down, strawberry plants reappeared in the greatest profusion, justifying the name of the Hanger. A Shropshire friend has mentioned to me a wood in that county closely shadowed by oaks; and when these were felled numbers of raspberries (*Rubus idæus*) quickly occupied the ground, though none had previously been observed in the wood. Mr. Jesse, also, in his "Gleanings of Natural History," relates that after a coppice in Devonshire had been felled, the ground it occupied became covered with the blue-flowered columbine, not before known as existing near the spot. I, not long since, noticed the ground of a felled coppice to appear at a little distance as red as blood from a crowded growth of the *Lychnis diurna*, where previously only a stray plant had been noticed on the edge of the coppice. Rare orchids, growing in woody places, often disappear when the foliage of the wood becomes very dense, and the following instance came under my own notice. In Minnery Wood, near Worcester, some years since, a considerable quantity of *Epipactis media* was growing; but as the foliage of the trees became thicker, and the shade darker, the plants became less in number every year, till at last none at all could be found. But they will probably reappear when in the course of time the wood is cut down. These and similar instances go to prove that seeds deposited in the soil can maintain their vitality for a long period, although when preserved above ground old seeds, as experiments have shown, become unproductive with age. The famous case in which raspberry seeds that were taken out of an ancient Briton's stomach, buried for centuries in a barrow, and which, when sown in a garden, vegetated, has had doubts thrown upon it; but a similar case is mentioned by Gærtner, as having happened in Germany, where seeds taken from the graves of ancient Gauls, buried, as it was thought, in the fourth century, produced *Heliotropium vulgare*, *Centaurea cyanus*, and *Trifolium minimum*. But the testimony of the late Dr. Lindley may be deemed the most reliable. He has stated that the seeds of the atriplex or orach "will lie in the ground for centuries without perishing." A few years since a layer of seeds was found in Scotland below a considerable bed of sand; they must, therefore, have been buried a great number of years. A portion of the seed was sent to Dr. Lindley, and on being set in the Horticultural Garden they produced the spreading orach. When the first railway was made at Worcester, I noticed an enormous quantity of *Atriplex hortensis* and *Beta maritima* springing up in the excavation made across Shrub Hill. It is possible that an old garden had been there, but even if so the seeds of the plants must have remained many years under ground.

Burnt soil does not appear to be uncongenial to some forms of vegetable life, but rather the contrary. I have often noticed that the spots where charcoal had been burned in Wire Forest soon get covered with a close growth of *Marchantia polymorpha*, and an excessive quantity of the hygrometric moss (*Funaria hygrometrica*). Flowering plants of different species quickly follow, while, as might be expected, fungi revel in that peculiar pabulum, as *Polyporus perennis*, and *Agaricus carbonarius*, as well as the scarlet patches of *Thelephora carbonaria*, always following the track of fire.

RAMBLES AFTER FOSSIL PLANTS.

In one of my rambles during our recent holidays in search of coal plants in the neighbourhood of Halifax, Yorkshire, I met with a nodule of the same character as those found near here, and which I have described in a former number of

SCIENCE-GOSSIP; these nodules are called by the coal miners of the locality "coal balls," and are found right in the middle of the coal-seam, and are composed of all kinds of vegetable tissues, seeds, spores, sporules, &c., which would have been coal had they not been calcified, and thus prevented from becoming bituminized.

The above nodule of which I am speaking was full of macrospores; I have often found detached macrospores in these nodules before, but never in such a large quantity: I should say it contains some thousands. These nodules are met with in what is called in the locality the "hard bed," because another seam of coal is often worked from the same pit-shaft, but a little below the above seam, called the "soft bed." This soft bed is the one Professor Huxley speaks of, in a recent lecture on coal, as being very highly charged with macrospores. These macrospores when found in the coal are almost invariably flattened, and do not appear to show any structure

Fig. 145. Microspore.

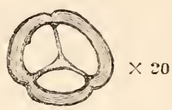

Fig. 146. Macrospore.

when the coal is cut into transparent sections. This is not the case with those found in the nodules above alluded to. The one I am speaking of was surrounded, to the depth of half an inch, with iron pyrites, and in every fragment I break are one or more of these detached macrospores to be seen, their dark outline showing beautifully against the bright sparkling character of the pyrites. Some individual spores show the caudate appendages, as at Fig. 147, but the capitate character of the appendages in the figure are only shown under favourable circumstances. I have seen them in transparent sections cut from these nodules, but under no other condition. When the macrospores are laid bare, so as to show the base, they have a triangular form, as shown at Fig. 147; the sides of the spores seem to be drawn inward on three sides, which gives the whole spore a slight triangular form. This triangular base is continued downwards, to form a sort of footstalk, by which the spore is attached to the bract of the fruit on which it rests, as seen at Fig. 148, and they are found resting on the bracts, sometimes in double and sometimes in treble rows. Fig. 148 is a rough sketch of one side of the middle part of this compound fruit, and shows two fruitful bracts at the part where the macrospores leave off, and the microspores begin, one of which is shown at Fig. 145. This fruit belonged to a species of *Lepidodendron*, the macrospores being situated at the lower part, and the microspores at the upper part, in this respect it bears a close analogy to our *Selaginella*. Brongniart, of Paris, was the first in 1868 to draw the attention of the botanical world to this old illustration of recent botany; his opinion is that the microspores produced antherozoids, which became fecundating organs, and that the macrospores germinated after being fecundated. Since Brongniart described this fruit, Mr. Binney, of Manchester, has described a very beautiful series of casts of this fruit from the Ironstone shales of Scotland, which show the fruit as they lay in the shale, with the bracts laid bare, and the microspores in position on the upper part of the fruit, and the macrospores in position at the lower part, with a portion of the fruit-stalk, by which it had been attached to the branch of the tree. I believe that Mr. Binney has a prior claim over Brongniart to the discovery of this fruit, but he neglected to describe it. I remember very well Mr. Binney showing me the specimen I have described above, about twelve years ago, but he did not describe it till 1870. Some little idea of the profuseness of these spores may be gathered from the fact that one or

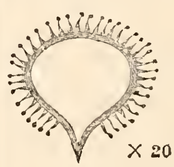

Fig. 147. Macrospore with caudate appendage.

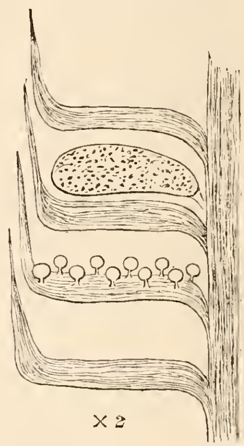

Fig. 148. Section of fruit showing spores enclosed in bracts.

two seams of coal have been almost entirely made up of them. I have sections of a bit of coal from a Leicestershire coal-seam that are full of them, and I have found them in the under-clay that lies beneath most of our coal-seams. I hope the short description I have given of this peculiar fruit will be interesting to the readers of SCIENCE-GOSSIP, and will be one more hint as to the important part the microscope can take in the investigation of various sciences, and not least, in that of Geology.

I shall have a number of these macrospores to distribute among the readers of SCIENCE-GOSSIP in a short time.

JOHN BUTTERWORTH.

Goat's Shaw, Oldham.

OUR readers will be glad to learn, that the Loan Collection of Scientific Instruments will be continued on exhibition for some time, on account of its success.

THE MICROSCOPE AND MICROSCOPIC WORK.

No. XI.—By F. Kitton, F.R.M.S.

The comparatively low refractive power of glass induced Dr. Goring to suggest the use of jewels in place of glass for the construction of lenses for single microscopes, hoping to make that form of instrument as perfect as reflecting or refracting engiscopes; "for single microscopes naturally aplanatic, or, at least, sufficiently so for practical purposes, possess an incontestable superiority over all others, and must be recognized as verging toward the ultimatum of perfection in magnifiers. The advantages obtained by the more improved engiscopes resolve themselves into *the attainment* of vision *without aberration, and with considerable angles of aperture;* but, against this must be set the never-to-be-forgotten fact that they only show us *a picture of an object instead of nature itself.* It requires little knowledge of optics to be convinced that this simple unadulterated view of an object must enable us to penetrate further into its real texture than we can hope to do by any artificial arrangement whatever; it is like seeing an action performed instead of a scenic representation of it." The above passage shows what an imperfect instrument the compound microscope, whether refracting or reflecting, really was; and Mr. Oldbuck was not far wrong when he said that its revelations were not to be depended upon. The endeavours to form lenses of a diamond were not successful. The first diamond Mr. Pritchard operated upon was lost, before he had quite finished it, and he says, "my only consolation was to discover that, had it been completed, its thickness and enormous refractive power would probably have caused the focus to fall within the substance of the stone." His next attempt was with a rose-diamond: this he determined to make into a plano-convex lens, and on the 1st of December, 1824, he had the pleasure of first looking through a diamond-microscope. Mr. Pritchard goes on to say that "after I had polished it sufficiently to put it into the hands of Dr. Goring, who tried its performance on various objects, both as a single microscope and as the objective of a compound, he stated in a letter to me, dated the 3rd of January, 1825, that 'it had shown the most difficult transparent objects I have submitted to it,' and again 'I can clearly perceive the amazing superiority it will possess when completely finished.'" (It ought to be mentioned that at that time the scales of the Podura were unknown as test objects.) The lens was, however, never finished, as on further polishing, several flaws were detected. After a year's delay, he resumed his attempt to make a perfect diamond lens, and succeeded in obtaining one without a flaw; but another obstacle to its correct performance now made its appearance,—it proved to be doubly refractive, giving two images, instead of one.

Mr. Pritchard was, however, enabled to overcome this difficulty, and at last succeeded in completing two perfect plano-convex lenses, one of the twentieth of an inch and the thirteenth of an inch focus; of these the Duke of Buckingham became the possessor. He afterwards made lenses of sapphires, rubies, and garnets. Fig. 149 is given by Mr. Pritchard to illustrate the longitudinal aberration of glass and diamond lenses of the same foci.

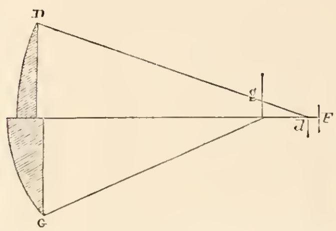

Fig. 149. Diagram showing longitudinal aberration of glass and diamond lenses.

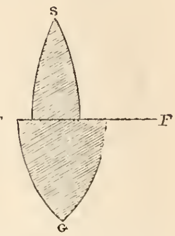

Fig. 150. Diagram showing respective curvatures of a sapphire and glass lens.

G represents the section of a semi-lens of glass; D, one of diamond. They are so placed that the principal focus, F, in each of them shall fall on the same point. The marginal rays will intersect the axis at *d* in the diamond and *g* in the glass, and the breadth of the space from *d* to E will be the longitudinal aberration of the diamond lens, and the space from *g* to F the longitudinal aberration of the glass lens.

The refractive indices of the diamond, garnet, ruby, and sapphire, and glass, are respectively 2·5, 1·8, and 1·5.

Great increase of magnifying power is, of course, obtained by the great refractive properties of jewels. A diamond ground to the same curves as would be required to form a glass lens of $\frac{1}{80}$ of an inch focus equal to 800 diameters would magnify 2,133 diameters, and would be equal to a glass lens of $\frac{1}{200}$ of an inch focal length. A sapphire or ruby lens, with the same curvatures, would amplify 1,333 diameters, and be equal to a glass lens of $\frac{1}{130}$ of an inch focal length. Fig. 150 represents the respective curvatures of a sapphire and glass lens, the upper half representing the sapphire, and the lower the glass lens, F being the focus. Lenses formed of gems possess a still further advantage, viz., their imperishability, the surface of glass lenses becoming oxidized in the course of time; but with all these advantages the jewel lens is a thing of the past, although, from its high refractive and low dispersive power, it was more nearly aplanatic than one of glass, it can

never equal even a moderately good compound objective of modern manufacture. The severest test objects of fifty years ago were the scales of insects, particularly those of Lepisma and Podura. Mr. Pritchard cautions observers to be sure of the kind of scale they are about to use as a test, as he truly observes some scales of Lepisma or Podura are easily revolved, while others tax the powers of the best objectives; this caution applies equally well to the present time. An objective may be guaranteed to resolve, say, *Pleurosigma angulatum*, but unless we know whether it is the robust form, such as those mounted by Möller, or the commoner and more delicate form we find on our own coast, we are still in ignorance of its resolving power. The following is a list of objects used as tests for jewelled microscopes and engiscopes. For penetration, first section (easy), scales of *Petrobius maritimus*, *Lepisma saccharina;* secoud section (staudard), "Feathers" of *Morpho menelaus*, *Alucita pentadactyla*, *A. hexadactyla* (from body), *Lycæna argus*, *Tinea vestianella* (from under-side of the wing); third section (difficult), "Feathers" of *Pieris brassica*, scales of *Podura plumbea*. For definition, hair of *Mouse*, ditto of *Bat*, leaf of *Hypnum* species, spotted scales of *Lycæna argus*.

The Lepisma scale seems to have been very fairly shown, judging from the figure given of it. The scale of *Morpho menelaus*, a somewhat more difficult test, displayed two sets of markings.

The appearance of the scales of *Alucita*, or plumed moths, is thus described:—"The scales should be taken from the body of the insect, and not from the plumes; their breadth is generally greater than their length, and their form is never symmetrical. They are transparent, and about $\frac{1}{180}$ of an inch in length. The scale is often partially covered by a delicate, uneven membraneous film, which obliterates the lines on those parts. The longitudinal lines are not difficult to resolve, but their proximity is such that they require a considerable power, and careful illumination to separate them distinctly. They are elegant microscopic objects, but rather scarce."

The favourite test appears to have been the tufted scale of the cabbage-butterfly, *Pieris brassica*. The genuine test scale is of a pale-yellow colour, and very transparent. This object requires the light to be more oblique than any other of the lined kind, and was seldom to be made out, excepting when the magnifier was much out of the axis of the perforation. "I [Mr. Pritchard] have seen them with a single jewel lens of only $\frac{1}{15}$ of au inch focus." Other markings were thought to be distinguishable on the scales, viz., a series of oblique lines running in opposite directions. "They are always fainter than the others, and both sets are never seen together. I have seldom seen them by daylight, and even with artificial light they are not easily resolved."

These lines have no real existence, as a reference to more modern figures will show. Quekett gives a very good figure (× 500 diameters) of this scale in his "Practical Treatise on the Microscope," 1848, plate 6, fig. 2. We come now to a test which still puzzles the observer, and even with the best objectives and most perfect appliances the real nature of the markings has not yet been satisfactorily demonstrated. The Podura scale was the *ne plus ultra* of tests for the objectives of engiscopes and jewel lenses, and, as a description of what the microscopes of fifty years ago would do in this object, we will quote Mr. Pritchard's account of the appearance of the markings as seen under one of the best instruments of the period:—"I have before remarked that on the discovery of any more difficult object thau what is already known, an improvement of the microscope has soon followed. This was strikingly exemplified in the discovery of the lines on the scales of this insect. They were observed accideutally by the late Thomas Carpeuter, Esq., of Tottenham, while making some experiments with a plano-convex jewel leus, employed as the objective of an engiscope, having a Huyghenian eye-piece. They were then submitted to various instruments, and from the difficulty with which they exhibited the lines even on the larger dark specimens, this object became of great consequence to the microscopist, and some of them were immediately transported, that our neighbours the French might try their hands upon them."

"I have never been able to see the lines on them with a power much below 350. It is also proper to observe that single magnifiers will resolve them, but not without considerable attention is paid to their illumination; but they are most easily made out by the simple light of a candle in the aplanatic engiscope, if it possesses an angle of 50 degrees, exhibiting all their delicate minutiæ with precision. The size of these scales varies from $\frac{1}{900}$ to $\frac{1}{100}$ of an inch in length, and they decrease in length as they become more transparent. Under a microscope not having sufficient penetratiou, the tissue appears devoid of markings; but, when placed in a superior one, and the illuminatiou properly made, they show a series of lines or cords on their surface, and present a much greater variety in their arrangement than the scales of any other species of insect. Some have the lines straight (the figure represents the scale with fine longitudinal continuous lines), and have two sets of oblique lines upon them; others are waved or curved (these lines iu the figure are distant, transverse, and irregularly undulate). I must not omit to notice that the cords on these scales are easily rubbed off in mounting."

We need scarcely observe that these descriptions are erroneous. We now know that there are neither oblique nor transverse lines; that the longitudinal

lines are not continuous; that the markings cannot be detached without destroying the scale; and that those scales that had the appearance of being rubbed were impregnated with some oily or fatty matter, probably exuded from the body of the insect. We have found the following to be the best plan for detaching the scales. After the insect has died and become perfectly dry, double a piece of smooth paper, place the insect close to the double, fold it over and rub the paper with the finger-nail; open the paper, remove the insect, place the part to which the scales are adhering on a thin cover, and again rub it; the scales will now be transferred to the cover, and will be found free from oil or moisture, and not injured by the process. This will also be found the most effective way of detaching the scales from the wings of butterflies; by this means the outer surface is placed uppermost, and the scales from the upper and under surfaces of the wing will occupy opposite halves of the cover.

In a note to the chapter on Test Objects, Mr. Pritchard makes the following remarks:—

"When it is considered that these lines (those on Podura and Pieris) are less than the twenty-thousandth of an inch distant, it must be allowed there is some difficulty in accurately determining their construction.

"The *Morpho menelaus* and *Lepisma saccharina* are of sufficient size to distinctly perceive they are composed of two delicate tissues with longitudinal cords (probably tubular) disposed between them; but in the two delicate ones, the subject of these remarks, we perceive other systems of lines disposed obliquely, and as they are extremely delicate, it becomes a question whether they actually exist, or whether they are appearances produced under certain modifications of the illumination. To determine this point, it became necessary to ascertain the cause which would produce such an effect; and it immediately occurred to me that these oblique lines were occasioned by the disposition and pressure of the superincumbent scales, in the same manner as the watery or wavy appearance is communicated to corded silks and moreens by the pressure of two pieces passed between rollers."

(*To be continued.*)

ON THE DISCOVERY OF MACROSPORES IN CARBONIFEROUS SANDSTONE.

MACROSPORES of the Lepidodendroid plants, or trees, have been described both by Mr. Salter and also by Professor W. C. Williamson, of Owens College, Manchester. The figures given by each somewhat differ in outline, but agree generally in the rounded figure which the "spores" present in perspective. When the macrospores are flattened vertically, a triangular ridge appears in their centres—"The flattened remnant of the angle resulting from four spherical spores mutually compressing each other so as to form a common spherical map, in the centre of which all the four spores are in mutual contact."*

These macrospores have hitherto been found in great abundance *in* the coal; and whenever a vertical section of coal has been cut, these "spores," very much depressed, have formed a microscopic slide very instructive to study. According to Williamson, their existence was pointed out by Henry Witham more than half a century since, though he was ignorant of their nature.

On the 16th of April last, I paid a casual visit to a carboniferous sandstone-quarry, worked for building purposes, in Wincobank Hill, Old Grimesthorp, Sheffield. The sandstone is above the Parkgate and Silkstone seams of coal, which crop out below the sandstone a short distance from the quarry on the northern side. The sandstone is from eighty to ninety feet in thickness, of variable texture, and dips towards the east at an angle of about 40°. Immense quantities of drifted calamite stems are found lying in different directions in the quarry, some of these varying in diameter from an inch to ten inches, with lengths likewise variable from three yards to two and three inches. For something like seven years I have visited the quarry off and on, securing specimens of the various species of calamites as they turned up, but during the whole of this time I have only secured two very indifferent specimens of Lepidodendron. On the above date I was with a friend, trying to give his mind a geological turn by giving him a geological lesson. When describing, in the lowest part of the quarry, the action of the water-flow by the position of the calamite stems, my eye fell upon a most unusual fracture in the stone. On examination, I found the fracture, about three inches in length, filled with a soft carbonaceous sandy material, which to me was quite new. I scraped the whole into a paper, and took a rough sketch of the spot until I could examine the mixture at home. When the whole was washed under running water and dried, I picked out from the mass about 200 of the macrospores, some of which I mounted and sent to you. Previously to this I sent some to a friend at Morpeth, and, at his request, some to W. Carruthers, Esq., F.R.S. I have now a few more for distribution, if any one interested in botanical studies desires a slide. Quoting from the letter I received from my friend, he says,—"As the woody nature has been in part preserved in these spores, you might possibly secure some stems that would reveal structure from the same spot." Acting upon this suggestion, I paid, a

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* W. C. Williamson, F.R.S.

few days after my discovery, a second visit to the quarry, but, by the removal of the stone, all trace beyond my sketch of the spot was lost. I found in its immediate vicinity abundance of stems of calamites, but no trace of Lepidodendroid plants; but when conversing with the quarrymen, they told me that the "scaly specimens" were scarce, but that near to this spot they found a few during the month previously to my first visit.

From the position of the stems, and also of the "spores," I inferred at the time that these must have been drifted from some carbouiferous forest to the west of these beds. I will draw the attention of your readers to H. C. Sorby's paper in the "Quarterly Journal of the Geological Society," and also your own extract from that paper in SCIENCE-GOSSIP.* The fossil forest in the coal measures described by him is directly west of Wincobank Hill, and being well acquainted with both places, I am satisfied that the current which drifted the waste wood, &c., into Wincobank Hill district flowed from the west.

Attercliffe, Sheffield. G. R. VINE.

SECTION AND SECTION CUTTING.

HAVING read with much interest Mrs. Merrifield's remarks on cutting sections of algæ, it occurs to me that a few notes on cutting sections of vegetable structures in general may prove not uninteresting to some of your readers.

Mrs. Merrifield must, I think, have been unfortunate in her experience of section machines if she discarded them for the more primitive method described in her paper, inasmuch as I have found the machine advertised in this journal as the "SCIENCE-GOSSIP Section Machine" all that can be desired, and the price (7s. 6d.) is very reasonable.

The needful appliances for all ordinary sections are:—

- A "SCIENCE-GOSSIP" or other section machine.
- A keen-edged razor.
- Sundry slips of glass, 3 in. by 1 in., and their glass covers, either round or square.
- A pair of needles set in wooden handles (those used for camel-hair pencils will do).
- A couple of small china saucers (those supplied in the cheaper descriptions of paint-boxes are, perhaps, best).
- A camel-hair pencil.
- A carrot.

* No. 128, p. 188.

The SCIENCE-GOSSIP machine, to which I give preference, as I am much better acquainted with it than with any other, consists of two long narrow inclined planes of nearly equal inclination, some 12 or 14 inches in length, the upper sliding in a groove in the lower. Over the middle is a small bridge of wood faced at the top with a level plate of brass, and pierced with a cylindrical hole about $\frac{5}{8}$ in. in diameter. In this hole is a piston, the rod of which rests on the upper plane. The object of which it is desired to cut a section is placed in the hole on the piston. It is evident that, if one plane be slid over the other, it will urge the piston upwards; but, as the inclination of the planes is nearly equal, the vertical motion will be very small as compared with the horizontal motion.

The mode of use will be best explained by an example. Suppose we desire to obtain a transverse section of a leaf. Draw out the two planes to almost their fullest extent; press down the piston till its rod is resting on the upper plane. A piece of hard wood is usually interposed to prevent injury to the plane. Next, cut a piece of carrot to fit the hole stiffly and come, when resting on the piston, nearly level with the brass top of the bridge. Now cut the carrot nearly through vertically; place the leaf to be cut between the two halves, which, when, placed in the hole, will support it firmly. Having fixed it in the hole, with a razor, thoroughly

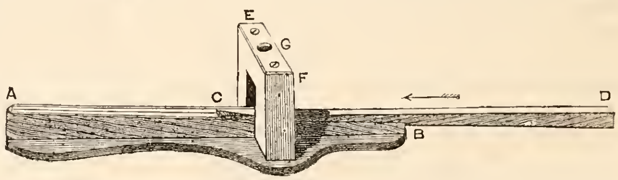

Fig. 151. "SCIENCE-GOSSIP Section Machine."—A B, C D, two inclined planes of nearly the same inclination, C D sliding over A B; E F, bridge faced with brass, and pierced with a cylindrical hole, G, in which is a plunger, which urges upwards the object to be cut, which is placed in it supported by pith, carrot, &c., when C D is moved in the direction of the arrow. A small piece of hard wood is placed between the rod of the plunger and the plane, C D, to prevent injury to the latter.

wet, cut the carrot and contained leaf exactly level with the brass; then push forward the upper plane say $\frac{1}{8}$ in., and make a second cut level with the brass. This will give you a very thin slice of the carrot and of the leaf along with it. With the mounted needles carefully push the slice altogether into the little saucer previously filled with water; move it about a little, when it will part from the leaf, which may be picked up on the point of a needle, or with the camel-hair brush if it be very delicate, and placed on a glass slip in a drop of water. Cover with a bit of thin glass, and place under the microscope. In this way, with a little practice, it will be found that the only limit to the thinness of the section is the sharpness of the razor; a thickness of only $\frac{1}{300}$ or $\frac{1}{400}$ is readily

obtainable. Carrot appears to be the best supporting material; turnips are too coarse, and potatoes are full of starch grains, which are very hard to get rid of. Elder pith is also, I believe, a good bedding material, but I have had no personal experience of it.

To give a list of the objects most interesting for section cutting would be a vast undertaking, as almost every vegetable object is worth cutting, and without such dissections it is impossible to obtain a correct knowledge of plant anatomy. Still a few may be named such as prothallia of ferns, various leaves, especially glandular or hairy ones, stems, stamens (anthers), ovaries, and seed-vessels of flowering plants, male and female, inflorescence of mosses (longitudinal sections), capsules of mosses, sporangia of ferns, &c.

Should it be desirable to keep a section for more careful examination than can be done at the time, remove the thin glass and the greater part of the water with a fine-pointed glass tube, or a piece of blotting-paper. Put a drop of pure glycerine, and replace the thin glass. Glycerine has the property of not drying up for a very long time, and does not affect vegetable tissues to any appreciable extent. Objects thus temporarily mounted in glycerine should of course be kept out of the way of dust. For mounting a section permanently the handiest medium is that known as "Dean's Gelatine," which is a stiff jelly, and is sold in small bottles 1s. each. Place the bottle in hot water till the jelly becomes fluid, put a drop on the section, and cover with the thin glass, cautiously pressing out as much of the jelly as will run out. It will set in a few minutes, and after a few hours the superfluous gelatine may be cleaned away with a knife, and a rag moistened with warm water when the mount is complete. A ring or two of coloured varnish improves the appearance and adds to its stability. This gelatine medium has two valuable qualities, viz., that being almost of the same density as sap and water, it does not alter the tissues mounted in it; and also, that it preserves the colour of the chlorophyll remarkably well.

In cutting sections in carrot or similar material, always see that the razor is well wetted, as it makes it cut much more easily, but it is better dry if pith be used. To explain the structures seen in the various sections no book is better than Sach's, which can be obtained in most good libraries, in either German, French, or English, the last French edition being perhaps the best.

Cutting sections of animal tissues I have wholly passed over, as so many involve hardening and preparations in various ways, that few but medical students who have recourse to a suitable laboratory are likely to pay much attention to this branch, albeit a most interesting and important one.

GREENWOOD PIM.

THE ORIGIN OF THE PLANT NAMES OF THE WARREN.*

WE pass on now to the Cruciferæ or Cruciform order, named ou account of the petals being in the shape of a cross. Of this order there have been found in the Warren, *Thlaspi arvense*, *Capsella Bursa-pastoris*, *Cardamine pratensis*, *Nasturtium sylvestre*, and *Sisymbrium officinale*. *Thlaspi arvense* (Field Penny Cress) is a mixture of Latin and Greek, *thlaspi* coming from the Greek verb *thlao*, to crush or to bruise, and *arvense* from the Latin *arvum*, a field. The plant was so named because the seed was bruised and used like mustard. Others say that the word is derived from the Greek verb *thlao* to flatten, and that Pliny mentions that the whole genus was named on account of the large flat seed-vessels; but the Greek word means to crush or bruise, although the idea of flattening may be implied in that of crushing. The name Cress is probably connected with the Latin *cresco*, to increase, and is used of this and similar plants which grow or *increase* rapidly. Penny Cress derives its name from the large flat seed-vessels around the upper part of its stem, which are about the size of silver pennies. *Capsella Bursa-pastoris* (common Shepherd's Purse) derives its name from the shape of its flat seed-pouch, which resembles a rustic purse. Capsella is a diminutive of *capsa acase*. *Cardamine pratensis* (Cuckoo Flower) is a mixture of Greek and Latin. *Cardamine*, according to Miss Pratt, is compounded of *kardia*, the heart, and *damao*, to fortify; which is altogether wrong, for the word *damao* does not mean to fortify, but to tame, to subdue, to overcome; nor can I think that the word has any connection whatever with *kardia*, the heart. There are three words in Greek, *kardamon*, *kardamis*, *kardamine*. Mr. Johnstone, with whom I have corresponded about this word, says that Cardamine is one of this triplet, the first, *kardamon*, being now taken as representing nasturtium, and the other two forms applying to some kindred genus of Cruciferæ or Cress worts, possibly Lepidium. Pratensis, is from the Latin *pratum*, a meadow. One common name of this plant is Cuckoo Flower. It is thus explained by Gerarde:—"It doth flower in April and Maie, when the cuckoo doth begin to sing her pleasant notes without stammering." Another common name is Lady's Smock, "given," says Dr. Prior, "on account of the resemblance of its white flowers to little smocks hung out to dry, as they used to be once a year, at that season especially." The next plant, Nasturtium, has an amusing etymology, viz., *nasus tortus*, a distorted nose, on account of the pungent properties of the plant, which produce violent sneezing, and therefore a temporary distortion of the nose. *Sylvestre* means woody, from the Latin *sylva*, a wood, a forest. *Sisymbrium*

* Continued from p. 131.

(Hedge Mustard) is the Greek name. Mustard is compounded of two Latin words,—*mustum*, new wine, which is said to be used in preparing it, and *ardens*, burning; it is, "burning must."

Let us pass on now to the Hypericaceæ. This order derives its name from the Greek word *huper-eikos*, the Greek name for St. John's Wort. It is compounded of two Greek words,—*hupo*, under, and *ereike*, heath, heather. The word therefore means under heath, under heather. The common name, St. John's Wort, was, according to Dr. Prior, given to the plant, "because it was gathered on the eve of St. John the Baptist's Day (June 24), to be hung up at windows as a preservative against thunder and evil spirits." The word "wort" is the old Saxon "wyrt," a herb, a plant. The plants belonging to the order Hypericaceæ, which are found in the warren, are *Hypericum androsæmum* and *Hypericum hirsutum*. The former, the common name of which is Common Tutsan, is named Androsæmum. from the Greek word *androsaimon*, which is compounded of *andros*, man's, and *haima*, blood. It is so called because of its blood-red juice, or because of the blood-stain left on the fingers after rubbing the flower, or because of an unguent made from it. Gerarde says:—"The leves, flowers, and seeds stamped, and put into a glass with olive oile, and set in the sunne for certaine weekes, doth make an oile the colour of blood, which is a most pretious remedy for deep wounds, and those that are thorow the body." The common name Tutsan is a corruption of the French *Toute Saine*, All-wholesome, All-heal, a name given to the plant on account of its healing properties. *Hypericum hirsutum* is the hairy St. John's Wort, and is so called because of the downy nature of its leaves.

Whilst every one has heard of, seen, and admired the Geranium, how few there are who know that the order Geraniaceæ has anything to do with that well-known bird, the Crane. The geranium, from which flower the order is called, derives its name from the Greek word *geranion*, crane's-bill, which is formed from the word *geranos*, a crane. The seed-vessel is said to bear a resemblance to the beak of the crane, and hence the name of the plant.

We pass on now to that very large order Rosaceæ, which derives its name from the Latin *rosa*, a rose. I shall only deal with two or three plants of this order. One, the Briar, we shall speak of afterwards in connection with the "Legends of Names." Let us take now *Cratægus oxyacantha* (Hawthorn or May), *cratægus* derives its name from the Greek word *kratos*, strength, because of the hardness of the wood; *oxyacantha* is the Greek *oxuakantha*, meaning sharp thorn, being compounded of *oxus*, sharp, *akantha*, a thorn. The common name Hawthorn is generally supposed to be derived from the red fruit which is called "Haws," but the word "Haw," derived from the Anglo-Saxon, means *hedge*. It is connected with the German *hagedorn*. It is, as Dr. Prior well observes, "an interesting word as being a testimony to the use of hedges, and the appropriation of plots of land from a very early period in the history of the Germanic races." The reason that the fruit is called "haws" is easy of explanation. From the fence or hedge the name would in course of time be applied to the shrub of which the hedge is composed, and then to the fruit itself of the shrub. The etymology of the name *May* is evident, being given on account of its time of flowering.

The order Grossulariaceæ is not unrepresented in the Warren, *Ribes grossularia* having been found there. This order is that of the Gooseberries. The name is evidently connected with the French *groseille*. "The name *ribes*," says Dr. Hooker, "is an Arabic word wrongly applied to this genus. The common name, gooseberry, is probably a corruption of crossberry, grossberry, or gorseberry, from *gorse*, furze." If this be the true derivation, it must be so named from the prickly nature of the shrub, or from the hairs on the fruit. Another explanation of the term "crossberry" is, that it refers to the triple spine, which often presents the shape of a cross.

The order Orchidaceæ receives its name from the Orchis, which is named from the shape of its roots, *orchis* being the Greek word for that particular shape. The names Bee Orchis, Spider Orchis, &c., speak for themselves, and require no explanation.

In connection with the Iridaceæ we have some French history. The Fleur-de-lis is not, as is often supposed, a lily, but an iris, the common name of which is Flower de Luce, or Fleur de Louis. "It was assumed," says Dr. Prior, "by Louis VII. of France as his device. The flower that he chose seems to have been a white one, for Chaucer says—

"His nekke was white as is the flour de lis;"

and there is a legend that a shield charged with these flowers was brought to Clovis from Heaven while engaged in a battle against the Saracens. It had already been used by the other French kings, and by the Emperors of Constantinople, but it is a question what it was intended in the first place to represent. Some say a flower, some a halbert-head, some a toad. Fleur de Louis has been changed to Fleur de Luce, Fleur de Lys, and Fleur-de-lis."

We must now bid adieu to the "History of Names" and come to the second division, the "Legends of Names," which will occupy but a very short time, as there are but few plants in the Warren, the names of which are connected with the Heathen Mythology.

Papaver somniferum (sleep-bearing poppy) at once suggests to us the God of Sleep, Morpheus, who

used to be represented as reclining on its flowers, and also holding them in his hands.

What a world of legendary lore is opened up by the common name Briar! It was given to the plant on account of its many thorns after the giant Briareus, who is related to have possessed one hundred hands and fifty heads. His name is derived from *briaros*, strong. There is a reference to him in Homer's "Iliad," book i., v. 403. Achilles, addressing Thetis, says:—

> "But thou, O goddess, having come, didst free him indeed from his chains, having quickly summoned to lofty Olympus the hundred-handed one, whom the gods called Briareus, but all men Ægeon . . . . . Him the blessed gods even dreaded, nor did they bind Jove."

Virgil also ("Æneid," book vi.) mentions this formidable giant in his description of the descent of Æneas into the Shades. Amongst others whom Æneas sees there is Briareus. Virgil mentions him again in book x.; Hesiod also mentions him, and speaks of him as the son of Uranus and Gea; whilst Homer evidently considered Neptune to be his father. However, culling from each, we learn that he was a giant, the son of Uranus or Neptune, and Gea, possessing one hundred hands and fifty heads; that by the gods he was called Briareus, and by men Ægeon, and that sitting next to Jove—so terrible was his appearance — he completely frightened Juno, Neptune, and Minerva, and prevented them from further plotting against Jupiter. Some say that after the war of the giants against the gods, he was thrown under Mount Etna. But this is commonly related of Typhœus, whose efforts to rise were said to occasion the eruptions of Mount Etna. From this account it can hardly be said that Briareus was a Sweet-briar. Another derivation, given by Dr. Prior, is not quite so mythical. The name Briar, is derived, he says, from the Anglo-Saxon "braer," French *bruyere*, called in Normandy "brire," from the waste land on which it usually grows.

Circea lutetiana, one of the order Onagraceæ, recalls to our minds the enchantress Circe, the recital of whose enchantments to us when we were children—to quote the words of Shakespeare—used to—

> "Harrow up thy soul; freeze thy young blood;
> Make thy two eyes, like stars, start from their spheres
> Thy knotted and combined locks to part,
> And each particular hair to stand on end,
> Like quills upon the fretful porcupine."
> "HAMLET," Act i., Scene 5.

The name Circea was by a mistake transferred from the mandrake, which was called Circea or Circe, because Circe is said to have used it as a Tempting Powder, or because she bewitched the companions of Ulysses with it. Amongst the Compositæ we find in the Warren *Achillea millefolium*, named after the Greek hero Achilles, whom we have already mentioned.

We come next to the order Iridaceæ, named after Iris, the rainbow, because of the beautiful colouring of the flowers. Iris was messenger of the gods, and especially of Juno. She is the same as the rainbow, and is represented, with all the different colours of the rainbow, sitting behind Juno, ready to carry out her commands.

There are many more plants in the Warren upon the Etymology of the Names of which I have not touched. Shakespeare makes Juliet ask the question, "What's in a name?" My endeavour has been to show that there is a great deal in the names of flowers.

SPIDERS AND THEIR WEBS.

I AM induced by the invitation of the contributor of the paper on "Spiders' Webs and Spinnerets" that appeared in the September (1875) number of SCIENCE-GOSSIP, to other observers to pursue the subject, to submit a few facts, culled from personal observation, of the habits of these generally despised, but interesting little creatures.

Having for many years bestowed some attention upon them, I have had opportunities of seeing peculiarities exhibited that I have not found mentioned in any work on spiders that has come under my notice; and perhaps by submitting a few facts, through the medium of your columns, to the notice of your readers, it may be ascertained if the peculiarities to which I propose to refer have been seen and noted by other observers.

Many years ago I saw a small spider of the genus *Linyphia* or *Nereine* drop upon the web of one of the *Epeira*, and immediately the latter came out of its retreat, rushed along its line of communication to the centre of the web, and, after trying all round to find the whereabouts of the intruder, hurried down the radius to capture it. But it came too incautiously, for as it attempted to seize the small spider, the latter, with a sudden spring seized upon one of the front legs of the *Epeira*, sank its fangs into it, and held on like a bull-dog.

From this moment the *Epeira*, though much larger, made no attempt to retaliate upon its puny assailant, but commence to pull with all its force to liberate the imprisoned limb. This was accomplished in a few seconds, when it hurried to its corner, and began, apparently with great anxiety, to work at the wounded limb with its palpi, falces, or labiæ (its movements were too rapid to say which). At first I had the impression that it was trying to suck the poison from the wound; but, judge of my surprise when I saw it pull the poisoned limb out of its socket and cast it away. On picking up the leg, I could see a small globule of poison glistening on the place where the small spider had fastened.

The voluntary amputative power manifested by

this occurrence reveals the fact that these spiders have a way of adapting themselves to circumstances that is perhaps unparalleled; and the whole transaction may well suggest the following queries. Did this doomed spider know that death could only be escaped by the amputation of the injured limb? Did it know that Nature, peculiarly kind in its case, would supply another leg to make up the deficiency? And how did this high precept ever come within the pale of its comprehension,—"If thy right hand offend thee, cut it off, and cast it from thee"?

Another habit that I have observed in some of the *Epeira* spiders is that of laying up a store of food in the cocoon, evidently for the sustenance of the young spiders from the time they leave the egg till they leave the cocoon. On examining one of

Fig. 152. Fac-simile of Spider's Web, made by a Spider just out of Cocoon, and obtained by dyeing.

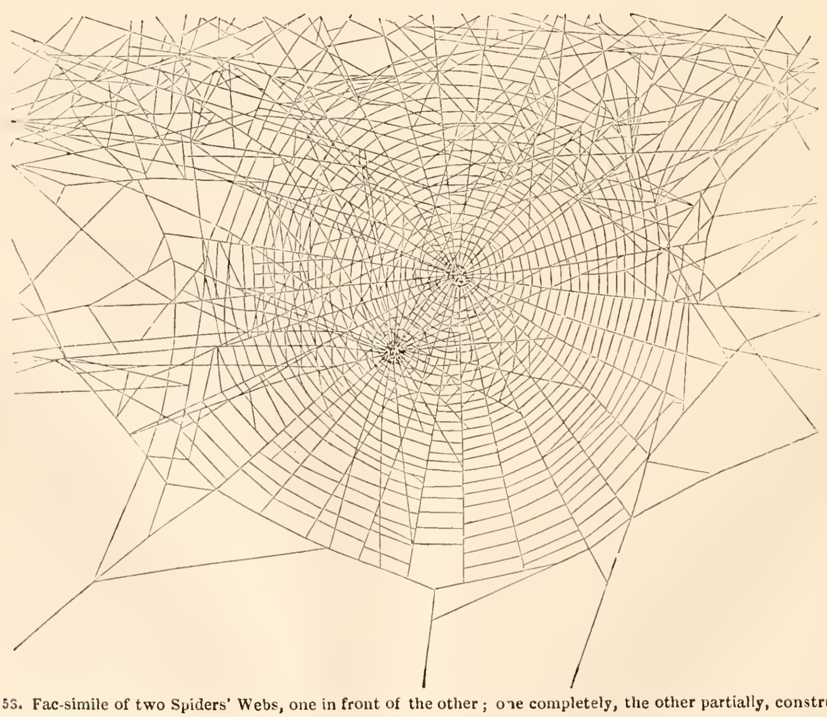

Fig. 153. Fac-simile of two Spiders' Webs, one in front of the other; one completely, the other partially, constructed.

these cocoons this spring I found within its meshes about half-a-dozen shells of the larvæ of the house-fly. The young spiders were just ready to leave the cocoon, and on examining the shells referred to, there was a small hole in each, through which all the interior of the larvæ had been extracted, doubtless by the young spiders during their infantile stage.

Fig. 154. Fac simile of Spider's Web.

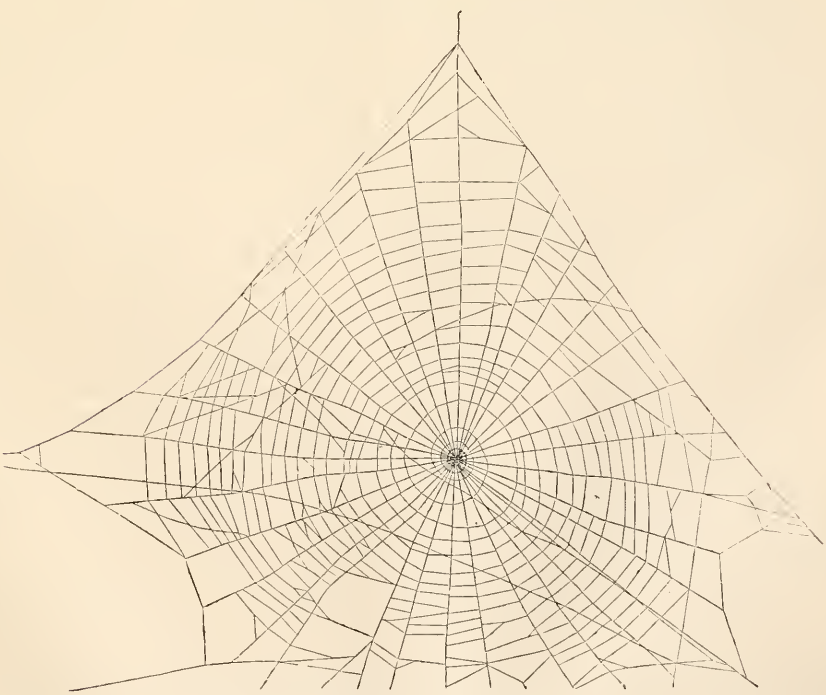

Fig. 155. Fac-simile of another Spider's Web.

I placed one of these young spiders in a suitable place, and it immediately began to construct a web, completing it in thirty minutes. These webs are very small at first, only some two or three inches in diameter, and the small creature is content to sit in the centre for a week or two, probably that it may the more readily catch the luckless midges that fly into the web; but in a few weeks, possibly through some law of development, it connects this centre by a cable to some convenient corner, where it has constructed its parlour.

I have succeeded in taking some *fac-similes* of these young spiders' webs, which are sent herewith; and though not as perfect as could be wished, they may interest your readers, if they can be reproduced by the wood-engraver (see figs. 152 to 155).

The one marked 152 is a copy of the web just referred to, made by a spider just out of the cocoon in thirty minutes; but unfortunately there was a failure in the copying, which I much regret, as the web itself was the most perfect one I ever had under the copying process. In constructing the circular portion of this web, the spider began in the centre and laid down the spiral by circuits, constantly increasing in diameter till it reached the extremity, when, reversing the order of its course, and going from left to right instead of from right to left, it laid down intermediate lines between those already made, till it got back to the centre again.

Thinking it may be useful to spider-students, I shall now explain the system by which I have taken copies of these fragile structures,—a system which may, if others try it also, be brought to greater perfection in another season. Observing one day in April last a window-pane covered with small spiders just out of the cocoon, and being unable to see any webs, even with an ordinary pocket lens, they were so fine and free from dust, the thought occurred to me that if the webs could be dyed some colour, it would render them visible, and then the exact form of the circles could be seen. Others, examining them at the same time, thought that there were no webs, but that the spiders were all suspended by their threads. Breathing upon them, however, produced a vibration in the spiders, and this convinced me that each was occupying the centre of an elastic and invisible web, and I at once began to try if they could not be dyed.

To accomplish this, I employed one of Mr. Siegle's Patent Steam Spray Inhalers,—an apparatus that is used for injecting remedial agents into the mouth for sore throat, &c. Into the small phial connected with this apparatus some aniline blue was introduced, the steam raised by a spirit-lamp, and, after the spider had been compelled by a few puffs of tobacco-smoke to vacate its position, the blue spray was showered all over the web, making it distinctly visible to the naked eye.

After getting thus far, it occurred to me that by bringing sheets of white paper gently into contact with these dyed webs while they were still wet a *fac-simile* might be obtained; and on putting this thought into action I obtained the accompanying results.

If these results are put under a good magnifier, it will be seen that small globules stud the radii as well as the circular part of the web, and my first impression on observing this was that the generally-received opinion that the viscid adhesive liquid which coats a spider's web is found upon the spiral part only was incorrect. But in considering further, and recollecting that the vehicle for conveying the colouring matter was steam, it occurred to me that this, by throwing the colour upon the web in globules, may be the cause of the dots upon the radii. As there is, however, some uncertainty on this point, the subject may well deserve further investigation.

By making a specially-arranged framework, upon which the young spiders could spin their webs, more accurate results might be expected; and perhaps some of your readers may, through the foregoing hints, be induced to experimentalize in a direction which I hope to pursue myself in the spring of next year. C. L. W.

DAMAR, AS A MOUNTING MEDIUM.

I THINK there are many amateur mounters who would use Damar in place of Canada balsam did they only know that it can be procured done up in tubes, so that the mounter has only to apply a slight pressure to the tube, and the damar flows freely on to the object. I am not aware that any notice of these tubes has been given in Science-Gossip, at least no such notice has appeared since I first became a subscriber, in 1872, to this popular journal. I believe that Walter White, of Litcham, Norfolk, is the only preparer of damar in the way I have above mentioned. Round every tube (which I may here mention costs 1s.) is wrapt a paper containing a few remarks on damar. From these I take the following: "Very fragile objects may be successfully mounted in damar with the greatest ease by merely laying the object on the slide, covering it with a thin glass cover, and allowing the medium to run under by capillary attraction. If a *very* slight pressure be applied to the cover, and the slide put away in a warm place, it will be ready for finishing in a day or two. In finishing a slide it is necessary, after the superfluous damar has been removed and the slide properly cleaned, to lay on the edge of the cover a coat of some tough varnish, to prevent the cover from being accidentally moved in hot weather. A solution of shellac in spirit is a good varnish for the

purpose; and if carefully applied, so as to fill up the angular furrow at the margin of the cover, it will make a very neat finish." I never myself adopt the plan of letting the damar run under by capillary attraction, always preferring to drop the damar *on* the object, and then lay the cover on that. There is no great necessity for warming either slide or cover before mounting. In my cabinet I have many objects which I have mounted both ways, and the results are quite the same; indeed, of the two I prefer not to warm the slide. I have both heard and read complaints of this medium by those who have had it made up from a receipt, and as two of the chief outcries are likely to affect both the damar in tube and the damar out, I will speak of them.

Firstly, many complain of the number of air-bubbles that rise while mounting. Now, I think that with a *very* little care this may be easily obviated. *I* never find any trouble from this cause, and I go to work in the following manner: Let me say that I am about to mount the leg and foot of a wasp; of course it has been treated before in the same manner as if it were to be mounted in balsam. I take a WELL-CLEANED glass slip, and putting a centerer under it, remove the object from the spirits of turpentine, and lay it by means of forceps on the slide; next see that the claws are well separated, and then *gently* squeeze the tube of damar, and when I see sufficient damar to cover the object, lay the thin cover thereon, and *gently* press. Possibly my object is not quite flat, and up goes the cover on one side, while air-bubbles rush in at the other. The moment I see this I take a spring mounting clip, and clip the object, then put away in a moderately warm place. In two or three days, on removing the clip, I find the object as free from air-bubbles as it can be. Thin fine objects need have no clip, as the air-bubbles will depart directly the cover is laid on. Looking over my back volumes of SCIENCE-GOSSIP, I find, in the volume for 1873, page 110, that a correspondent, signing himself "W. S. Palmer," complains of the little use he finds damar, owing to these air-bubbles; and he further asks whether any of the readers of SCIENCE-GOSSIP have been *more* successful? As far as I can see, no one has given his experience, but he will be able to see from this that at least *one* correspondent has been successful; and should W. S. Palmer still find so great a difficulty in mounting with this medium, if he will send me his address, I shall be most happy to send him a slide mounted in the way I have described.

Then, secondly, many say they can do nothing with damar, because it is so liquid that it will not dry. Now, I admit that there is more to be said against damar for this than from the complaint of air-bubbles; but still I do not think *many* of my objects have been spoilt through this. Certainly, I find that even in a warm place the slide takes more than *two* days to set; for instance, some slides that I mounted on March 14th were not ready to finish off until March 21st; but then the result was good, and I do not think *any* microscopist would object to waiting a little, providing the result in the end was gained.

Lastly, as to finishing off, *some* varnish must, of course, be used, and I always use the asphalte varnish, which I buy at the optician's—a bottle costs sixpence. I always have used this, and continue to do so (though it is *useless* when mounting with glycerine jelly), because I find it is in *every* way good. Run a good ring round, and I think there is no need for fear about the cover moving; if, however, you like a pretty finish, run round a ring of red sealing-wax varnish, and then just at the *edge* of that a ring of asphalte varnish, and the effect will be very good. I think I can do nothing further now than advise every reader of this to give the damar IN TUBE a fair trial; it can be obtained from the preparer, Walter White, Litcham, Norfolk, or through any optician, which perhaps is the best mode of procuring it, as then it gets to be known more generally, for I find that as a rule it is *not* kept in stock. I never was so successful with balsam as I am with damar, and I trust all my readers may shortly say the same.

Redland. CHARLES WILLIAMS.

MICROSCOPY.

VITALITY OF EGGS.—M. Colosanti has recently made some very interesting experiments on the duration of vitality of the *macula germinativa*. Experimenting with hens' eggs, he found that in the first twenty days after the egg is deposited, development of a chicken may take place; after that epoch development is not the rule, but the exception. But the germinal spots which did not produce chickens always showed some development, though incomplete. This shows that the evolution is not the result of a force which exists or does not exist in a germ, but rather of a force subjected to quantitative modification, and which expires gradually.

PROFESSOR EHRENBERG.—This famous naturalist, with whose researches every microscopist must have come into contact at some period of his life, died at the end of June last at a very advanced age. Although a great many of his views have been modified during his life, his work has only proved that it is easier to revise than to discover. Ehrenberg was a great man, and all true naturalists will do homage to his intellectual worth.

WYTHE'S ILLUMINATOR.—In the *American Naturalist* for July, Dr. J. H. Wythe recommends for oblique illumination a right-angled prism, with a plano-convex lens, cemented to and covering one of

its narrow sides, and an ordinary French triplet fastened to the other, close against the farthest angle. Arranged with the plano-convex lens directed downward, the axis of the triplet would be horizontal, and a horizontal cone of achromatic light would be furnished; while, by slightly tilting the apparatus, an available and extremely oblique illumination would be obtained.

The Potato Disease.—Dr. Hunt states that the potato disease fungus (*Peronospora infestans*) destroys the potato starch in the cells of the tuber. Under the microscope he has noticed the general absence of starch in the cells attacked by the Peronospora, although the fact of such invasion being productive of the result described had been denied.

A New Preservative.—Mr. A. M. Edwards, of Newark, New Jersey, has been successfully engaged in a series of experiments on the properties of salicylic acid as a preservative for microscopical purposes. He has exhibited casts of the uriniferous tubes obtained from *Nephritis*, which were mounted in a dilute solution in 1874, and are now in as good a condition as when first put up. *Volvox globator* can be preserved in this solution with equal success.

Animal Circulation.—Take a young water-snail (*Planorbis*) on a slide in a shallow cell with water; apply a strong light under it, and with an inch objective you can see the action of the heart beautifully. I find it better to get old ones. Keep them in a bottle with food till they breed, and then the youngsters, kept in clear water, will have much more transparent shells.—*F. Barnard*, *Kew*, *Victoria.*

"The Microscopy of Starch."—My husband, for pleasure, has worked at the microscope, mounting objects, &c., for upwards of fifty years. About twenty years ago he mounted, in *balsam*, potato flour, tous-les-mois, Bermuda arrowroot, &c. We were looking at these specimens last evening: they are as perfect as ever. "J. C. Thompson" may be interested in the above fact.—*F. S.*

ZOOLOGY.

"The Aquarium, its Inhabitants, Structure, and Management," by J. E. Taylor, F.L.S., &c.—Our position with regard to this book forbids us to do more than announce its publication. It is hoped that all interested in aquaria, public and private, marine and fresh-water, will find it a popular manual. All the animals yet acclimatized are noted, and hints are given for their further domestication. Lovers of nature will, it is hoped, be here provided with instruction how to proceed in everything relating to aquaria. The work is illustrated with nearly 300 good engravings, and all that remains is for us to thank the publisher for introducing it to the public in such an excellent and attractive manner.

Embryology of the Salpidæ.—At the Boston Natural History Society, Dr. W. K. Brooks has made a contribution to the embryology of Salpa, which is startling to naturalists, and will be of great importance if confirmed. He says that in tracing back the history of the zooids composing a chain, the egg is present at all periods of growth, of exactly the same size and appearance as at the time of its impregnation. He concludes that the animal, which has no existence, cannot be the parent of the egg which is already fully formed. Thus the explanation is that the solitary salpa is the female, which produces a chain of males by budding, and discharges an egg into the body of each before birth. These eggs are impregnated while the zooids of the chain are very small and sexually immature, and develop into females, which give rise to other males in the same way. After the fœtus has been discharged from the body of the male, the latter attains its full size, becomes sexually mature, and discharges its spermatic fluid into the water, to gain access to the eggs of other immature chains. This arrangement is compared with other cases, as in cirripeds, arachnids, argonaut, in which the male is to some extent parasitic on, or supplemental to, the female.

The "Popular Science Review" for October contains some excellent articles, noticeable among which is that by the Rev. W. H. Dallinger on "Practical Notes on Heterogenesis." This will be eagerly read by all who take an interest in the "Origin of Life." Professor Tyndall's paper on "The Parallel Roads of Glen Roy" is another contribution to the already abundant literature on these peculiar geological phenomena. Mr. H. J. Slack has a paper on "Human Personality," and the editor a telling one on the "Vivisection Clamour." In this number the editor, Dr. Henry Lawson, bids farewell to his readers, after having ably occupied the editorial chair for many years. We understand that his successor is Mr. W. S. Dallas, F.L.S., the Secretary of the Geological Society of London, and one of the first writers on natural science of our time.

Strange Commensalism.—M. Trécul has recently made a singular communication to the Paris Academy of Sciences on the capture of rattlesnakes, and the supposed association of these serpents with a small owl and a small dormouse. When travelling, in 1848, in the region west of Arkansas, he caught snakes by passing over them, when erect, a loop with running knot attached to his ramrod; they remained quite straight and were easily killed. The

"villages of little dogs," or dormice, are sometimes pretty large, *e.g.*, half a kilometre in diameter. One was in a fertile district covered with high herbs, but the ground of the village was entirely denuded by the animals, and little earthworks thrown up, with holes in them, and communicating together. The dormouse takes a survey from the top of these eminences, with only his head thrust out. In coming out, which they do most cautiously, they give a small sharp bark. In another village the author saw a little owl issue from one of the burrows, which was also evidently frequented by dormice; and in another burrow was a rattlesnake; but this burrow had evidently been long deserted by the other animals.

BOTANY.

British Fungi.—We are pleased to notice the timely issue of Dr. M. C. Cooke's "Plain and Easy Account of the British Fungi." The coloured plates are all new, and are not exceeded by anything of the kind yet published. This is the third edition, and Dr. Cooke has thoroughly revised it, and made many important additions. As a popular work on fungi it is the best, cheapest, and most attractive of the kind in our language, and students of this interesting and much neglected group of plants cannot do better than procure it.

Elodia canadensis. — This plant is rapidly spreading and flowering in the streams of West Sussex. Can any one tell me how this pretty pest is best kept down?—*F. H. Arnold, Fishbourne, Chichester.*

Snowdrops.—With reference to Mr. Wesley's note in the August number of Science-Gossip, concerning the question as to whether or not the Snowdrop is indigenous, I can inform him that the plant flourishes in the greatest profusion on the sandy banks of the rivers in Mid Devon, which, indeed, during the spring-time are, for miles and miles, white with the blossoms of the flower. From this I consider there can be no doubt but that the Snowdrop is a native of this country; for it seems to me impossible it could ever have been planted in such abundance as to have spread over the very large extent of ground these river-banks occupy.—*J. L. Vincent, Forest-hill.*

"Plant Crystals."—I do not wish for a moment to deny that the crystals of calcium-salts in fallen leaves may serve, as Professor Gulliver suggests, a manurial purpose. Recent researches show that the leaves annually shed by an acre of beech-trees between thirty and a hundred and twenty years old, yield 73 lb. of lime, 9 lb. of phosphoric acid, and 3 lb. of sulphuric acid. I do not, however, believe either that the crystals are formed chiefly, or originally, for the purpose of manure, or that their presence constitutes by any means the chief value of leaf-mould. I am not aware of any case in which crystals of calcium-phosphate occur in plants; the carbonate and oxalate are common. As far as we yet know, calcium itself is not directly necessary for any physiological purpose. Compounds of phosphoric acid seem, however, necessary to the formation of albuminoids, as also are those of sulphuric acid. Oxalic acid (C_2 H_2 O_4) is formed in the plants themselves, and in a free state is poisonous to the plant itself. The plant obtains its sulphuric acid chiefly, or perhaps entirely, from calcium sulphate (gypsum), which is probably decomposed by the oxalic acid, calcium oxalate being thus formed, which in its insoluble crystals is harmless to the plant. So also calcium acts as a vehicle for phosphoric acid. Thus, calcium oxalate must, as Holzner and Sachs, from whom I have derived much of the above information, have pointed out, be looked upon as a secondary product of metastasis (*stoffwechsel*); that is to say, as formed in the separation of formative materials from the assimilated food of the plant, but being perfectly inactive, and of no use in building up the cells of the plant.—*G. S. Boulger, Agricultural College, Cirencester.*

Ruppia spiralis.—The æstivation of this slender and delicate flower at so late a season as the middle of September is worth notice. The curiously-curled rings of the peduncles, as they are now to be seen in plants from Chichester Harbour, are a good criterion, but another is the period of flowering. Can any one inform me of the precise time when *Ruppia rostella* flowers?—*F. H. Arnold.*

Varieties of Colour in Wild Plants.—To "A. F. G.'s" list in the September Science-Gossip, I can add the following short *supplemental* one,—of course, from my own observation:—*From purple to white—Campanula glomerata*, chalk downs, Freshwater, Isle of Wight; *Ajuga reptans*, chalk, near top of Bulbarrow, Dorset, and old red sandstone, near Sidmouth, South Devon. *From purple to pink—Prunella vulgaris*, chalk banks, Stapleford, South Wilts; *Scabiosa succisa* and *Scabiosa columbaria* (together), in undrained wet ground (chalk), Stapleford. *From red to white—Ballota nigra*, chalk bank, Shrewton, South Wilts; *Thymus* (*serpyllum* or *chamædrys*), chalk, Stapleford Down, South Wilts; *Galeopsis tetrahit*, chalk, top of Bulbarrow, Dorset; *Lychnis diurna*, Yarcombe, South Devon; *Carduus palustris* and *Carduus arvensis*, both frequent, chalk, South Wilts. *From red to pink, or flesh-coloured—Papaver rhœas, Anagallis arvensis*, and *Orchis morio*, all chalk, Stapleford, South Wilts. *From yellow to cream-coloured—Helianthemum vulgare*, chalk bank, Woolland, Dorset. In Harpford

Wood, near Sidmouth, *Veronica montana* is found in abundance of a reddish purple colour. In a meadow near it, by the river Otter, I also met with several plants of *Cardamine pratensis* bearing double flowers, like those seen by "A. F. G.," near Worthing. *Convolvulus arvensis* has also been pointed out to me, with double flowers, on a chalk-bank, at Shrewton, South Wilts.—*W. Moyle Rogers.*

How to Take Impressions of Plants.—The following is a simple method of taking impressions of plants, requiring only a large sheet of paper, some olive (or other) oil, black-lead, ashes, and resin (or colophony). The paper is first lightly oiled on one side, then folded in four, so that the oil may filter through the pores, and the plant may not come into direct contact with the liquid. The plant is placed between the leaves of the second folding, and in this position pressed (through other paper) all over with the hand, so as to make a small quantity of oil adhere to its surface. Then it is taken out and placed carefully on white paper; another sheet is placed above (since two impressions can be taken), and the plant is pressed as before. On now removing it an invisible image remains on the paper. You sprinkle over this a quantity of black-lead (or ashes, or other fine powder), and distribute it in all directions, as in applying sand to writing; the image then appears in all its parts. With an assortment of colours the natural colours of plants may be reproduced. To obtain fixity, resin is added to the blacklead (previously) in equal quantity; the impression is fixed when it is exposed to a heat sufficient to melt the resin.

GEOLOGY.

Intra-glacial Palæolithic Implements.—Mr. S. B. J. Skertchley, F.G.S., announces the discovery by himself, at Brandon, in Suffolk, of Palæolithic flint implements in brick-earth underlying the well-known "chalky boulder clay," associated with bones and fresh-water shells. The implements belong to the crude type.

The Phosphate Beds of South Carolina.—Most of our geological readers will be acquainted with the fossils from the Carolina phosphate beds. Dr. Leidy remarked, at the Philadelphia Academy of Sciences a short time ago, that these phosphate beds were remarkable for the irregular admixture of multitudes of fossils of different ages, from the early Tertiary period inclusive down to the present epoch. So far the fossils in many respects are similar to those found in the phosphate nodules of our Suffolk Red Crag beds. Dr. Leidy said that the Carolinian phosphatic beds appear to have had their origin from the Eocene rocks beneath. These have also contributed numerous remains of marine vertebrates, especially of zeuglodonts, reptiles, and fishes. Mingled in the sand and clay, with the phosphatic nodules and bones of Eocene animals, are innumerable remains of cetaceans, sharks, &c., of the Miocene and Pliocene periods. A still further mingling of quaternary shells and bones with these two sets renders the confusion all the greater. The teeth of the great shark (*Carcharodon megalodon*), as well as of the extinct mastodon, point out the fact that these creatures survived in America to a later period than they did in Europe.

The Mechanism of Production of Volcanic Dykes and on those of Monte Somma.—A paper read before the Geological Society, by R. Mallet, Esq., F.R.S., F.G.S. The author stated that in 1864 he made a careful trigonometrical survey of the escarpment of Monte Somma, especially with reference to the numerous dykes by which the rocks composing it are intersected. He described in detail the phenomena of direction of the dykes, especially as regards the axis of the cone of Vesuvius; to this direction he gives the name of *orientation.* Of twenty-seven dykes ten presented an approximately vertical line, whilst all the rest had a sensible dip or "hade." The dykes are in no cases intersected by coherent beds of lava, but in one instance the top of a dyke was stopped by such a bed. Many of the dykes bifurcated or branched, and frequently two dykes intersected each other at considerable angles. These and other circumstances prove that the dykes were produced at different and successive ages. Many of them were fractured and displaced in consequence of movements of the mass of rock traversed by them; and these dislocations are regarded by the author as indicating the vast extent and force of the internal movements, due principally to gravity, which are constantly taking place in the mass of volcanic cones. These movements greatly influence the position of the dykes, and render it difficult to ascertain that which they originally occupied. The dykes thin out at various heights, and their superior and northern terminations were found not to reach the existing surface, notwithstanding the amount of denudation that has taken place; and hence the author concludes that they never reached the surface of Somma, when it was the wall of an active volcano. The author further indicated a process by which beds or plates of lava descending the slopes of a volcano may change their direction, and becoming imbedded in the detritus accompanying or following them, may, to a greater or less extent, simulate dykes, although in this case the two sides of the plate will present the differences always seen in the upper and under surfaces of a bed of lava. The orientation-lines of five or six of the observed dykes were said to pass approximately

through the axis of the cone of Vesuvius, but all the rest presented great diversities, and some, when prolonged, would not touch the cone at all. In making a lithological examination of the dykes of Somma, the author directed particular attention to the position of the elongated air-bubbles found in the material of each dyke, considering that the direction of the longest axis of these bubbles would indicate the flow of the material when in fusion. He stated that on the whole the long axes of the bubbles are nearly horizontal or pointing at moderate angles upwards in directions very nearly parallel to the plane of the dykes at the place where they occur. Hence he inferred that the dykes were filled by injection, not from below, but nearly horizontally. The author further referred to the mineralogical characters of the materials of the dykes, and stated that they are not all composed of eucitic lava; he also mentioned the occurrence of cross columnar structure in some of the larger ones. After referring to the differences observable in the physical condition of the two surfaces of some dykes, the author proceeded to consider the mode of origin of the fissures which, when filled, constitute volcanic dykes. He maintained that the production of a fissure and its filling with molten matter must have been simultaneous and due to the same cause, namely, the hydrostatic pressure of the liquid lava more or less filling the crater, the pressure originating the fissure into which the pressing liquid at the same time enters: a fissure thus produced and filled will always be widest near the crater, so that if the material of the cone were perfectly uniform the dykes produced would be wedge-shaped. But from the absence of this uniformity and other causes, fissures commenced at the interior and propagated into the mass of volcanic cones can rarely be uniformly distributed round the crater or produced in regular vertical planes in a truly radial direction. Hence the author concluded that it is unsafe to attempt to fix the position of an ancient crater by means of the intersection or concurrence of the lines of apparent orientation of dykes alone. The author stated that the intrusion of volcanic dykes cannot so greatly influence the slope of volcanic mountains as has been supposed.

NOTES AND QUERIES.

Entomological Phenomenon.—I came across the following extract lately in the "Annual Register" for the year 1771. It may interest some of your entomological readers. It is contained in an account of a dreadful famine in the neighbourhood of Calcutta, written by a correspondent of Mr. Urban, in the East-India Company's service, and first published, apparently, in the *Gentleman's Magazine*:—"In the month of August" (the writer says, whose signature is J. C.) "we had a very alarming phenomenon appeared (*sic*) of a large black cloud at a distance in the air, which sometimes obscured the sun, and seemed to extend a great way all over and about Calcutta. The hotter the day proved, the lower this cloud seemed to descend, and for three days it caused great speculation. The Brahmins pretended that this phænomenon, which is a cloud of insects, should make its appearance three times; and if ever *they* descended to the earth, the country would be destroyed by some untimely misfortune. They say that about 150 years ago they had such another bad time, when the ground was burnt up for want of rain. This is the second time of this phænomenon's appearing, and that *they* came much lower than is recorded of the former. On the third day, the weather being very hot and cloudy, with much rain, we could perceive them with the naked eye, hearing a continual buzzing. About one o'clock they were so low as 30 feet from the ground, when we saw them distinctly to be a great number of large insects, about the size of a horse-stinger, with a long red body, long wings, and a large head and eyes, keeping close together like a swarm of bees, seemingly flying quite on a line. I did not hear of any that were caught, as the country people were much frightened at the prognostications of the Bramhins. Whilst it rained, they continued in one position for near a quarter of an hour; then they rose five or six feet at once, and in a little time descended as much, until a strong north-west wind came and blowed (*sic*) for two days successively, when they gradually ascended and descended in the same manner, but more precipitately, until next morning, when the air was quite clear. It was very remarkable that for some days before the appearance of this phænomenon the toads, frogs, and insects, which in numbers innumerable always make a continued noise here the whole night, during the rains disappeared, and were neither seen nor heard except in the river." This famine, according to the above writer's account, was most terrible. The cause is by him attributed to the English engrossing large quantities of rice in anticipation of a bad crop, and to the native granaries at Calcutta being burnt down.

Colour of Birds.—Can I find out, through the medium of Science-Gossip, what other British birds besides the following have been found white or ivory-coloured? Jay (*Garrulus glandius*), cuckoo (*Cuculus canorus*), common thrush (*Turdus musicus*), blackbird (*Turdus merula*), skylark (*Alauda arvensis*), tree-sparrow (*Passer montanus*), house-sparrow (*Passer domesticus*), rook (*Corvus frugilegus*), woodcock (*Scolopax rusticola*), goldfinch (*Carduelis elegans*), bullfinch (*Pyrrhula vulgaris*), chaffinch (*Fringilla cœlebs*), jackdaw (*Corvus monedula*), starling (*Sturnus vulgaris*), swallow (*Hirundo rustica*), are all to my knowledge. I should be very glad if any of your readers could add any more to this list, and say where they are to be seen.—*A. P.*

The Cuckoo's Eggs.—The late Bishop Stanley, in his "History of Birds," vol. ii. p. 77, says:—"The Cuckoo can build a nest, and rear its young ones as well as another; for a clergyman near Glossop, in Derbyshire, not only saw a cuckoo rise from its nest, built on the stump of a tree, but in it found two young ones; and by way of ascertaining whether they were under the care of the real or foster parents, he confined one of them to the nest, and for many days saw the old cuckoo feed it

as regularly and tenderly as the poor little bird did its monstrous nursling, as already mentioned in vol. i. p. 207.—*H. J. Taylor.*

Cuckoo's Eggs.—As some of your correspondents do not appear to me quite to understand the theory with regard to the coloration of the eggs of the Cuckoo advanced by Dr. Baldamus, but seem under the impression that this learned ornithologist believed the hen-cuckoo possessed the power of laying eggs of any colour at pleasure, or at least of influencing their colour, will you allow me to state in his own words, as nearly as they can be rendered into English, what his supposed discovery really amounts to? His theory is really a very beautiful one, and remarkable for its bearing upon the principle of natural selection, as pointed out by Professor Newton. So far from asserting that the female cuckoo "can voluntarily influence the colour of her eggs," he expressly rejects the theory, and gives his reasons for so doing, adding by way of summary, "Thus all experience *hitherto made* declares for the assertion *that every hen-cuckoo lays only eggs of one colouring, and consequently* (as a general rule) *lays only in the nest of one species*,"—a species to the eggs of which her own have a resemblance. Again, in the summary at the conclusion of his paper, he repeats this opinion even more strongly in the following words:—"Every hen-cuckoo lays eggs only of a fixed colour, corresponding (as a general rule) with the eggs of that warbler in whose nest she lays them, and she only lays in other nests when, at the time for laying, one of the species of her own peculiar type, as we may say, is not ready." I quote from the Rev. A. C. Smith's translation of Dr. Baldamus's paper in the *Zoologist* for April, 1868. In these two brief sentences is embodied the pith of this theory, which is largely supported by evidence and the production of an immense series of eggs; there is certainly nothing to lead us to the strange idea that the coloration of the egg of the Cuckoo is a voluntary act on the part of the parent bird, but quite the contrary. I confess my experience does not tend to confirm the law which Dr. Baldamus fancies he has discovered; but it has been seriously entertained by some of the best ornithologists of the day, and emanating from so high an authority as Baldamus, it commands our respectful consideration until we can either disprove or confirm it. Dr. Baldamus has been very much misrepresented by some English naturalists, which doubtless arises from their not having received their information first hand, the "Naumannia," the German periodical in which he first made his theory known, being very little known in this country. This has led to criticisms altogether irrelevant to the subject; he has been first misrepresented, and then it has been sought to disprove the misrepresentations.—*Thos. Southwell, Norwich.*

Midges and Thunder-flies.—Several small species of *Tipulidæ*, especially the common *Chironomus*, greatly resembling gnats, and frequenting marshy places; also, the *Psychoda*, the short, broad-winged little fellow found on our windows the year through, are known as Midges. For want of precision in its use, the term Midge has but little value. "C. H." asks, are they the same as Thunder-flies? Thunder-flies are a species of *Thysanoptera*, or fringe-wings, better known as Thrips; very plentiful during the summer; and, though minute in size, the effect of their bite is very irritating. I believe much of the annoyance attributed to harvest bugs, *Acarus autumnalis*, is really occasioned by this little pest. They are known in Kent as "Nidgets" or "Nidges," and I fancy the similarity in name has misled "C. H."—*H. E. Freeman.*

The Sea Serpent.—I herewith enclose an extract from a pleasantly written book called "The West Coast of Africa," by Commander Hugh McN. Dyer, R.N., which I think will be interesting to the readers of Science-Gossip, as throwing some light upon that somewhat mythical personage "The Great Sea Serpent." The author also was shown by Consul Livingstone, at Old Calabar, a great natural curiosity in the shape of fishes with *eyelids*. They were, he says, about four inches long, of a light brown colour, and capable of giving a palpable electric shock. These were alive and swimming about in a basin. I should be glad if any one would kindly furnish further particulars, with drawings, if possible, of this peculiar fish.—*J. F. Cranswick.*

The Mythical Sea-Serpent?—Captain the Hon. M.H. Nelson, H.M.S. *Druid*, and Commander Prescott Stephens, H.M.S. *Bittern*, were about to leave the *Torch* on the evening of the 26th July, 1872, then at anchor off Cape Coast, to return to the *Druid*, which was off Elmina, when our attention was drawn to a great commotion in the water, at about half a mile from the ship, and presently a large eel-shaped fish, with dark back and white belly, put its head, or what appeared to be its head, about twenty or thirty feet into the air, and came down with a great thwack on the water twice, when a whale of great size, bottle-nose, length not less than sixty feet, sprang into the air, coming down with a splash that may be imagined. This was repeated two or three times, the whale ultimately going away to sea. I was told afterwards, the other fish was a "thresher." It might have been its tail and not its head we saw, for its movements were too rapid and the splashing of the water too great to see distinctly. It appeared to us, in size round, about twice that of a man's body. The depth of water in which this took place was about ten fathoms. Lieutenant Jeffreys and the officers of the *Torch* all witnessed, and all were equally surprised at the incident. I saw the same thing again a few days afterwards near Bootry, also in shoal water, but much less of the thresher appeared above water, and the whale's jump was much higher and more frequent. I have seen whales jumping in this way, also off the river Congo.—"The West Coast of Africa," pp. 71 and 72. *By Commander Hugh McN. Dyer, R.N., H.M.S. Torch.*

Hawfinch.—Although this handsome finch is not indigenous to these islands, yet for the past two or three winters it has been met with, generally in pairs only, never in flocks; and, in company with the Pied Finch and Yellow-hammer, feeding on our barn floors in Cheshire. I saw one kept as a curiosity in a cage in a labourer's cottage for a few weeks; it eventually pined away and died. I believe it must have been a mistake to record it as having bred in this country.—*R.*

Strange Birds.—Can any of your correspondents give me any information about a pair of birds which I have just bought, of which I do not know the names? The cock is wholly black, almost blue in sunlight, with bright red feet, and beak delicately tinged with pink. The hen is at present moulting, her colour is dappled brown and black. The man from whom they were bought called them "Stale" birds, and said they came from South

Africa. As yet they are too shy to sing much, but the hen has a sweet little whistle; their chirp is very harsh. They are a little larger than tree-creepers, with a beak like that of a finch. I can find nothing about them in Wood's "Birds," and should be much obliged by any information about their habits, &c.—*Edith de B. Meyrick, Blessington, Co. Wicklow.*

THE SWALLOW-TAILED BUTTERFLY (*P. machaon*).—J. S. Wesley says of this butterfly that it "need not be looked for in Kent." I have a specimen in our museum, caught at Folkestone this summer. It is damaged in the hind wings.—*Henry Ullyett, Folkestone.*

MICROSCOPIC QUERY.—Dissecting one of those large, *black*, hairy spiders that are met with in cellars, stables, and such places, and seeing something on the slide I could not clearly make out, I put on a higher power, and found it to be what I should call a feather, a fir-shaped hair, and on further examination, found the legs to be covered with them. Can any of the many readers of SCIENCE-GOSSIP say that they have found such feathers on spiders of a *light* colour? I have not, this being the first time I noticed them.—*H. Macco.*

WATER-VOLE.—Your correspondent who met with the water-rat (Arthur H. Borrer) whilst fishing, nibbling or eating the leaves of some shrub, was doubtless very much astonished, as I should have been a few years since. Let this fact guide all sportsmen,—rats, including the water-rat, are too shy to be caught eating in open daylight, if any observer is in sight. On the contrary, the water-vole, which is not related to the rat at all, but is a near relative to the extinct British beaver, is a very tame and harmless animal; it may be watched with deep interest on any pond without fear of its perceiving your presence; and it is exclusively a vegetable-feeder.—*R.*

BIRDS LAYING AWAY FROM THE NEST.—When a boy at school, I have found many eggs laid in the open field, without the semblance of any nest. No doubt your correspondent "E. B. T." has picked up the egg of the Starling. If eggs are exposed to the sun for a few hours, they gradually lose much of their colour. This I can prove to be the case with eggs of the Thrush: a bird of this species built her nest on the bank of an open meadow, exposed to the sun's rays all the afternoon; the parent birds forsook their home, containing I think three eggs. I watched the nest for about a fortnight; then, when I collected the eggs, they were almost white.—*R.*

LONGEVITY AMONG THE MOUNTAINS.—During a recent visit to Dôlgellan (old Welsh form), after rambling among the mountains, I came upon the little ancient village of Llanfachreth, beneath Rhobell Fawr, and walked about the churchyard, being struck with the remarkable number of very old people whose earthly remains lie entombed therein. Some of the oldest I give as copied, being then careful in walking round the enclosure not to repeat any. Three slate stones side by side record ages of 89, 76, 85. Three more, side by side, 89, 70, 82. Two, side by side, 89, 88. One stone has ages of 81 and 79; another, 78 and 89; another, 81 and 90. Three stones stand thus in ages, 83, 76, 84, one slab only between first and second. Then, again, one stone has recorded an age of 89, and two stones on the south of it, another giving the great age of 92. Besides these, and carefully excluded from them, I copied into my note-book, these ages, 89, 86, 84, 85, 81, 82, 82, 85, 81, 88, 81, 83, and 90, given in the order read off, excluding here those under eighty, many being nigh thereon. This I thought very remarkable:—"Elizabeth, wife of William Davies, aged 89. Also of the above William Davies, aged 89." There were graves of children here and there; but such are the healthy conditions of life, that few deaths are recorded of persons in middle life. Any one can verify the above by visiting this ancient village of Meirioneddshire (old form).—*Horace Pearce, F.G.S.*

HISTORY OF THE MICROSCOPE.—SCIENCE-GOSSIP, No. 138, has a charming paper on the Microscope. No. VI., by F. Kitton, Fig. 64, at page 124 gives "a remarkable instance of evolution" of an "infusorial animalcule as described in 1754." At page 122, "If Darwin had only come across a similar instance, he would have traced man to this animalcule." Will you allow me to read the description in another light, suggesting no evolution, but a very old and well-known principle? An infusion of anemone was kept for eight days, when a creature was produced in it "representing a human face." Is not this a curious illustration of the peeled wands placed before Laban's flocks by the sagacious Jacob? The person who made the infusion looked into it constantly, to watch progress. May not his face have been magnified by the aid of the water, and the glass on the eye of the animalcule, and copied by it direct, as the wands were copied indirect by the coming progeny of the goats, and as a passing impression on the eye of a mother is often copied on her human progeny? There is no change of kind, therefore no evolution.—*H. P. Malet.*

CORMORANTS.—In the passage from Milton, quoted in the article "After Cormorants," in SCIENCE-GOSSIP recently, the words "like a cormorant" are an imitation of a Greek form of expression so habitual with Milton. The word "like" means "after the manner of," "resembling," and refers to the general nature and appearance of the bird, and does not mean simply sitting as a cormorant sits; for why of all birds a cormorant? Yarrell says, "They are frequently seen sitting on posts, rails, or *leafless* trees by the water-side," &c. Again, further on, "That cormorants possess considerable intelligence is shown by several circumstances." Milton's learning was most extensive, and every word was weighed and full of meaning. That excellent observer, Mr. Charles St. John, in his book on Morayshire, says, amongst much other matter, "The cormorants sit in rows on some favourite rock, with their wings spread open like the figure of a spread eagle." "The eyes are placed very forward; they are of a pale green, small, and have a peculiarly cruel and fierce expression. The plumage is of a glossy black."—*J. S. Wesley.*

BRITISH CLEARWINGS.—The two insects which used to be named *Sesia fuciformis* and *Sesia bombiliformis* are now included with the Humming-bird Moth under the generic term Macroglossa, the genus Sesia consisting only of those of which the larvæ "live unseen," as the author of the article alluded to correctly states. Doubleday's, or Knaggs and Staunton's, arrangement should be followed. Sesiidæ should, I think, too, have two i's. Knaggs so spells it.—*J. S. Wesley.*

Birds' Eggs.—It is useless for "E. B. T." to speculate much as to what his egg may be. Birds are constantly interfered with, and compelled to lay an egg under circumstances which alter its shape, size, colour, and texture. He had better show the egg to an experienced collector, and abide by his decision.—*J. S. Wesley.*

Birds' Eggs.—In answer to "E. B. T.," I should think that the egg spoken of was that of the Nightjar, from the shape and situation, but for the colour, which has been white clouded with pale purple in all that I have seen.—*R. J. S.*

Flycatcher's Nest.—A song thrush built a nest on a hanging bough of a spruce fir, where she hatched and brought up four young ones. On examining the apparently deserted nest a month later, we found that a flycatcher had built a beautiful nest *inside*, where she was sitting on four eggs, since hatched.—*H. M. C. A., Barcombe Rectory.*

Small Tortoiseshell Butterfly (*Vanessa urticæ*).—In reply to your correspondent F. A. Edwards (p. 165), there is no difference that I am aware of between the markings of the male and female of the *Urticæ.* I have taken a few pairs this year, and the only distinction I find is that the females are larger than the males.—*H. C. Dent.*

Parasites on Cyclops.—Genus *Cothunia.*—*C. imberbis* (*Vorticella folliculata*, M.) Found on *Cyclops quadricornis.* Pritchard writes:—"*The stilt little bell animalcules* possess divisibility of the body but not of the lorica, which is urceolate in shape and supported on a rigid pedicle. A wreath of cilia is placed upon the flat frontal region, &c." A few minutes since I saw the cilia at play, and was reminded that a query respecting these parasites had been put to the readers of Science-Gossip. It is not often my restless Cyclops will allow me time to watch the bells. I would refer to Pritchard's "Infusorial Animalcules" (1852), plate 5, fig. 257. —*F. S.*

Caterpillars.—The following facts may interest the readers of Science-Gossip, as they can be vouched for by the lady who related the story to me. She was walking in a field at Lyme Regis, and picked up a caterpillar answering the description of the "Death's-head Moth,"—body long, colour bright green, with yellow stripes, and a curious-looking face. She carried it home, placed it in a tumbler, over which she tied her pocket-handkerchief; very soon it had eaten a large hole in the cambric. She then tied another piece, which soon shared the same fate'; eventually the creature was missing. On the following morning, the servant, cleaning the drawing-room, noticed that the Indian matting was eaten in holes; and on search being made it was found on a footstool, in the centre of which it had made a hole, and carried the bits of matting, carefully placing them in the form of a nest, itself lying in the midst. It was removed from there, and placed in a pot of earth, with brown paper tied over, with holes pricked in to admit air. It contrived to work its way to the paper, and bored the holes much larger. The lady, leaving the neighbourhood, left it in the care of a friend, who, not being interested in its development, allowed it to die. Are caterpillars in the habit of carrying materials for a nest? I always imagined they spun a cocoon round their bodies, and then gradually turned into a chrysalis, previous to their emerging from their shells as moths.—*M. A. B.*

The Wryneck.—The interesting article on this bird in the May number, should elicit further notes from observation. It is stated that the Wryneck sometimes lays ten eggs. A young friend took fifteen from one nest in this neighbourhood, one of which I still possess. Is the Wryneck shy? It seems rather a bold bird. I once saw one caught in a room in Sussex, and a question arose, would it eat house-flies? This was at once settled by taking it to a window. When held in the hand it rapidly devoured them, and after thus having had a good meal, it was at once transferred to liberty. Probably, as Mr. Hall remarks, it would soon have died if kept in confinement.—*F. H. Arnold, Fishbourne.*

Anecdote of House-sparrow.—In my short experience of interesting anecdotes which relate to animal life, not one has struck me so forcibly, of the affection some birds have for their young, as an incident which occurred in the life of a little house-sparrow, which we have succeeded in rearing up to be a fine healthy bird, and is, at the time I am writing this (August, 1876), living in our aviary. We found this sparrow in a yard, at the back of our house; having fallen from its nest, under the gutter on the roof, before it could fly. We hardly knew what to do with the little thing, as we had tried to rear several of them before, but without success; all invariably died before reaching an age to enable them to shift for themselves. Not wishing to leave it in the yard where we had found it, for fear of cats, we at last decided to put the bird into our aviary, to let it have a chance of living, which stood close against the window of a room in the front part of the house. Early the next morning, one of the servants told me that while fulfilling her duties in the room where the cage was, she was surprised to see, on looking towards the window, which was open, an old sparrow, evidently the parent of the little one, feeding the latter through the bars of the cage with worms and various other insects; the little sparrow manifesting great signs of delight, chirping loudly between the intervals of the old bird's absence to fetch more food. Although several other sparrows came to make a feast on the bread crumbs, which we placed upon the window-ledge for the young bird to be fed with, the little sparrow took no notice of them whatever; but as soon as the real parent came in sight, its manner changed directly; fluttering its wings and chirping in anticipation of something good to eat, until its attentive parent had somewhat appeased its ravenous appetite. The visits of the parent bird were continued at short intervals throughout the whole of that day, and for several following, until the young bird was able to feed itself, and then the affectionate and attentive parent suddenly disappeared, and we saw no more of her. The old bird, doubtless, must have heard the young one's cries for food, and recognized the voice.—*F. J. R., Shepherd's Bush.*

Phosphorescence.—In answer to "J. E. S.," I beg to say that when digging in the garden at night I have often noticed a phosphorescent light to proceed from the common wireworm, and have also observed it in a large centipede that had been drowned in a bucket of water.—*R. J. S.*

Goose-grass.—Young geese are particularly fond of this plant, when it is in a growing state,—they will graze it eagerly; but I have not observed the same partiality for it on the part of the old birds.—*H. E. W.*

Large Bream.—On Thursday, May 4, I bought a 4 lb. bream which had been taken out of the Trent, at Keadby, the day before. It was the largest, finest, and best-fed fish of the kind I had ever seen. When cooked, its flavour far surpassed that of fishpond-fed bream. The Trent has been long famous for its salmon; if it could produce many bream of this kind, it would be soon famous for it also. Is not this an unusual size for a bream?—*A. P.*

Singular-looking Stones near Tichborne.—I accompanied a party of friends to some races held on Tichborne Down several weeks ago. We drove from Petersfield, and a large heap of stones was pointed out to me as the memorable "cairn" mentioned in the trial; but I was more struck with the appearance of some enormous blocks which stood on a waste piece of ground on the other side of the turnpike road. They were placed in a circle, forming a kind of cromlech or Druidical temple (on a small scale of course), each big transverse block being supported by two or three smaller upright ones. I should much like to know the history of this Hampshire monument.—*Helen E. Watney.*

Culverkeys.—In reply to W. G. Piper's question, Science-Gossip, page 118, I would beg to say that the "couplet indentifying Culverkeys with Pigeon Peas," appeared a few weeks ago in the *Staffordshire Advertiser*, published at Stafford, the birthplace of Isaak Walton. The paragraph further stated that there was some reason as well as rhyme in the two lines—

> "Culverkeys, Culverkeys,
> Why they are Pigeon Peas."

Culver being, as before stated, the Anglo-Saxon for a pigeon, and key is a seed-vessel, and the flowers of the vetches are for the most part blue, "azure." The wild pigeons feed on vetches, which are of the same natural order as the "pea"; therefore, we presume, it may be more than probable that Isaak Walton alluded, as suggested in the extract, to the tufted vetch, when he spoke of "azure culverkeys," instead of the "tuberous pea" (*Orobus tuberosus*), as formerly stated in Science-Gossip, page 94. *Vicia cracca*, the tufted vetch, is called in Gaelic "Pessair luch-na-coille." Dr. Plot, in his "Natural History of Staffordshire" (p. 204), says, "that the tufted and wood vetch advance starven or weak cattle above anything yet known." The "Gentle Angler" mentions the word "culverkeys" twice in the "Complete Angler"; first in the lines alluded to in Science-Gossip (p. 94), where they occur at the end of the first chapter of his book, and then again in the fifteenth chapter, where, as alluded to by Dr. Johnson in his Dictionary, it is said, "Looking down the meadows, I could see *here* a boy gathering lilies and ladysmocks, and *there* a girl cropping culverkeys aud cowslips, to make suitable garlands to this present month of May." I venture here to remark that all the flowers named in the lines quoted from the "Complete Angler," Science-Gossip [(p. 94), may be found flowering in May. The present "data" iu my possession will not allow of more being now said on the subject of these interesting plants; perhaps opportunity may arise for doing so at a future time.—*E. Edwards.*

Age of Eels.—Can you, or any of your readers, tell me how many years eels are supposed to live? I have had one, the common sharp-nosed eel (*Anguilla acutirostris*), in my aquarium upwards of twenty years, and although it has often, wheu the aquarium has been too full of water, got out at night, and been found in the morning stiff and dry upon the hall floor; it seems as if it would live another twenty years, for it is as fresh and vigorous as ever. Its meals have been irregular enough to have killed it a dozen times; for with the exception of what it gets out of the water, and a minnow or stickleback or two, it is not often fed; but when it does get a worm it seems to have great satisfaction, retiring beneath the shingle, with its head just above the bottom, it lies quietly for a day or two while digestion goes on. It will swallow a worm eight or nine inches long, with a relish, providing it be fresh and clean, free from slime, and not breeding. It prefers to swallow it head first, for when it takes it by the tail it will sometimes disgorge it, and wait an opportunity to seize it by the head. What the poor worm thinks of the process I often wonder, for it can be seen through the skin of the eel wriggling about in the stomach in a most uncomfortable manner. During the tweuty years it has been in the aquarium, it has grown about seventeen inches; it was about three inches when first put in, and is now twenty inches long, and weighs only 2½ ounces. It is too large now for its home, but I am very reluctant to part with it, aud as I should like it to die in the cradle of its youth, among its old associates, minnows, carp, sticklebacks, roach, &c., I shall be glad to know how long it may be expected to live.—*Ben Plant.*

Birds' Eggs.—In reply to the query of "E. B. T.", I beg to offer my opinion. I should think the egg in question is probably a starling's, laid by it, after its nest had been taken, and it has been obliged to lay it in the place found by your correspondent. I have frequently found starlings', blackbirds', and wheatears' eggs under similar conditions: the colour might be occasioned by exposure to the weather, as a wheatear's, which I fouud on an old wall, was as white as snow, and deformed.—*G. E. B.*

How to Manage a Formicary.—Three or four days ago I stocked my formicary with the *Formica nigra* taken from a large nest, found in the somewhat sandy soil of the kitchen garden. In about half an hour after their introduction, they set to work excavating in every direction, so that in an hour or two all the eggs and cocoons had disappeared below the surface. Their exertious are continued night and day, so that the soil is in many places quite honeycombed. Every morning, however, I find fresh occupants of the water surrounding their domicile. I have not observed any attempting to commit suicide, and they could not have been washed overboard. At intervals they carry the corpses and drop them over the sides of the landing, just as they occasionally do with the pieces of earth. I think it is that they do not eat sufficiently. They have refused everything yet tried. Lump sugar, a former correspondent iu your columns suggested, flies, raw flesh, meat, earwigs, which I have ofteu seen them struggling with in their old haunts, fruits, &c. One or two appear to relish their dead relations, but they are few aud far between. I should be glad if you could give me any information through the medium of your columns, as their interesting movements amuse my leisure, and I should be loth to part with them or lose them.—*F. C.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

C. H. MACER.—You will find all the eighteen specimens of zoophytes you sent us to be named given in the "Answers" column of SCIENCE GOSSIP for last January. We had misplaced the name, and so gave them under the head of "Zoophytes."

M. A. TOOKE.—The insect is the well-known Water Scorpion (*Nepa cinerea*).

LARVÆ ON HOPS.—The larvæ found on hops, but which afterwards refused to feed on them, are those of *Orgyia pudibunda*.

M. F.—Your specimens are as follow: 1, *Crocallis elinguaria*; 2, in too bad a condition to make out; 3, *Triphæna pronuba*, male; 4, a Polyzoan zoophyte, called *Membranipora pilosa*.

A. PICKARD.—We are sorry to say your plants came to us so thoroughly withered that we could not identify them. They should have been pressed in blotting-paper.

J. FULLER.—For instructions as to preparing skeletons of leaves see article in the February number of SCIENCE-GOSSIP for 1872.

H. GOULD.—Your fern is the Spleenwort (*Asplenium adianlum nigrum*).

J. BOYS.—Your plant is the Biting Persicaria (*Polygonum persicaria*).

M. BAILEY.—Your plant is evidently the Common Mithridate Pepperwort (*Lepidium campestre*); but the specimen came to hand so badly that it was difficult to make out.

Y. Z.—The backs of the leaves are apparently covered with the first stages in the development of some species of "mould."

J. G. H.—We should be glad to receive your paper.

M. MURTON.—You will see advice as to how to get rid of "clothes"-moths in the last few Nos. of SCIENCE-GOSSIP.

D. E. J. (St. David's).—Construct an aviary against the south side of your garden wall, so that birds can fly within; or obtain the "artificial birds' nests" described in the *Animal World*, to entice birds to nest in your garden. 2. The "woolly substance" found on the Wild Rose is called "Bedeguar," and is formed by a species of *Cynips*. 3. The bird you mention is evidently the Water Ousel (*Cinclus aquaticus*).

H. M. HALLIDAY.—The "spongy" fungus on oak-tree was most probably *Polyporus squamosus*.

T. C.—The "minute shells" in flint are evidently those of foraminifera, probably a *Rotalina*. Your zoophyte is *Lepralia hyalina*.

M.—Your gault fossils are:—No. 1, *Ammonites splendens*; 2, *Ammonites planulatus*; 3, *Ammonites laulus*; 4, portion of ditto; 5, natural cast of *Pleurotomaria*; 6, fossil coral (*Trochocyathus*); 7, *Terebralula*; 8, portion of *Turrilile*.

W. W. KAY.—Your specimens are the skeletons of the hinder feet of a young badger (*Meles taxus*).

DR. D.—With the exception of Pritchard's "Infusoria," we know of no single work that will give the information required. Smith's "Synopsis of the British Diatomaceæ" is the only English work that gives figures of all the British ferns known at the time of publication (thirty years ago). The figures and description of foreign species are scattered through the Transactions of English and foreign societies.

EXCHANGES.

AN Amateur Botanist desires to correspond with another for mutual improvement.—Address Thos. F. Uttley, Clarke's Field, Cheetham Hill, Manchester.

I WANT several good Kestrel's Eggs, side-blown. I will give good Eggs in return. Lists on application. All letters answered. Cards allowed. — William Petch, Heeley Wes. School, Sheffield.

MOUNTED Slides of Berg-mehl (Norway) to exchange for good Slides or Material.—H. A. Francis, Keswick House, 48, White Ladies'-road, Clifton, Bristol.

MOUNTED Specimens of Fresh-water Algæ (*Coleochaete scutata*) for other well-mounted objects of interest.—M. Needler, 9, Crown-terrace, Fountain-road, Hull.

FOR *Brachycladium penicillatum* on leaf of Common Mallow send stamped envelope or other object of interest to Mrs. S., Brentford End, Middlesex.

DUPLICATES.—*Sibylla, Paphia, Adippe, Selene, Euphrosyne, Lucina, Aleas, Ægon, Corydon, Cardamines, Galathea, Tages, S. Ligusiri, Chrysorrhæ, B. Quercus, Polatoria, Humuli, Lupulinus, Maculata, Montanala, Bipunctala, Alomaria*, &c., for others.—R. J. Stent, 70, Queen-street, Portsea.

BARBADOES Earths, from Cambridge Estate and Springfield, extremely rich in Polycystina, Diatoms, and Spicula, in exchange for first-class Balsam Mounts, at the rate of six slides per oz.—Dr. Griffin, 66, Kingsdown-parade, Bristol.

Cyprina Islandica given in exchange for other British Shells.—Miss H. Joss, Invergordon, N.B.

FOR a portion of a Child's Caul, send a stamped directed envelope to W. H. Gomm, Somerton, Somerset.

NOS. 75, 176, 218*b*, 236, 238, 239, 245, 253. 271, 287, 305*b*, 346, 406, 576, 634, 722, 723, 727, 812, 821, 823, 838, 856, 891, 901, 974, 1,031, 1,058, 1,059*b*, 1,117, 1,327, 1,349, 1,397, 1,458, 1,506, 1,614, 1,615 "London Catalogue," 7th edition, also Bulbs of *Scilla verna* for planting, offered for British Plants dried, list of which will be sent on application to H. E. Fox, 70, Warwick-square, S.W.

FERN Seed, unmounted *Norlhochlæna, Chrysophyllum*, and *Nivea*, Gold and Silver Fern, and many others, to exchange for any other good object. — C. Malyon, Victoria-road, Lewisham, S.E.

I HAVE just received a fresh supply of Loango Sand, which I offer for exchange for a well-mounted object or good material.—C. Eaton, 48, Currers-lane, Ipswich.

Alopecurus bulboens and *Ruppia spiralis* offered for 1,437, 1,446, 1,453, 1,457, 1,505, 1,519, 1,521, 1,522, 1,601.—Rev. F. H. Arnold, Fishbourne, Chichester.

I HAVE several interesting Marine Objects for distribution, unmounted; amongst them Caprellas, figured in SCIENCE-GOSSIP for October; other Crustaceans and various Microscopic Material; ten different Diatomaceous Deposits, &c. Send stamp for particulars.—T. M'Gann, Burrin, Oranmore.

WANTED.—A dozen specimens each of *Crocus sativus*, and *Scilla autumnalis*, in exchange for *rare* British Plants.—Mr. Higginson, Newferry, Birkenhead.

OFFERED.—Donn's "Hortus Cantabrigiensis," new, in exchange for some Fossils or Minerals.—T. S. Hargreaves, Castle Villa, Stafford.

WELL-mounted Slides of Sole-skin (opaque), and some named Foraminitera, for other good Slides. Lists exchanged. —J. Woollett, 58, Cloudesley-road, Islington, London, N.

DUPLICATES.—*A. Galathea, S. Semele, S. Megæra, S. Janira, H. Sylvanus, E. Jacobeæ, C. Dominula, L. Chrysorrhœa, L. Dispar, O. Potatoria, L. Impura, M. Arenosa, M. Fasciuncula*; Desiderata, British Lepidoptera, or British Birds' Eggs, and L. and F. W. Shells.—A. H. Shepherd, 48, Roden-street, Holloway, London, N.

OFFERED.—Nos. 84, 87, 173, 180, 184, 220, 237, 241, 313, 518, 715, 735, 749, 878, 906, 907, 1,281, 1,283, 1,337, 1,499, 1,507, "London Catalogue," 7th ed., for other rare or local Plants. —Wm. Jordan, Cockfield, Sudbury, Suffolk.

FOR Slides of Spiculæ of *Urasler Rubens* send good Unmounted Material or other Slide to J. P., 63, Legh-street, Warrington.

BOOKS, &c., RECEIVED.

"The Aquarium: Its Inhabitants, Structure, and Management." By J. E. Taylor, F.L.S., &c. Pp. 316; gilt edges; 239 illustrations. Price 6s. London: Hardwicke & Bogue, 192, Piccadilly.

"Transactions of Cardiff Naturalists' Society, 1875."

"Transactions of Watford Natural History Society." Part 5.

"American Journal of Microscopy." August.

"American Naturalist." August.

"Popular Science Review." October.

"Monthly Microscopical Journal." October.

"Land and Water." October.

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 10TH ULT. FROM:— F. K.—G. H. K.—E. E.—T. S.—C. P. O.—J. F.—J. R. S. C. —C. E. M.—H. L.—J. S.—Dr. G.—J. F. R.—J. W.—T. F. W. —F. H. A.—Mrs. S.—F. S.—C. M.—E. de B. M. B.—C. E.— J. E. V.—H. E. F.—J. F. C.—T. C.—H. E. F.—J. L. V.— H. A. F.—W. G. S.—W. P.—J. F.—W. H. G.—H. E. W.— Mrs. T. E.—E. M.—W. D.—Q. R.—F. B.—J. T.—J. B.— J. T. R.—R. J. S.—R. B.—Dr G. D. B.—H. U.—M. N.—J. F. —W. H. G.—M.—A. P.—Dr. G.—M. B.—C. H. M.—W. W. K. —R. G —W. J.—W. A. C.—J. C.—A. H. S.—C. D. W.—J. W. —C. W.—T. Mc G.—A. S.—G. B.—T. S. H.—J. W. D.—A. M. —C. F. W.—G. G.—T. W.—H. H.—J. S.—G. S.—&c., &c.

THE MICROSCOPE AND MICROSCOPIC WORK.

No. XII.—By F. KITTON.

WE have endeavoured to describe the progress made in the construction of the microscope since its invention by Zacharias Jansen in 1590, and have also glanced at the work done with them, and shown that it has in very many cases been valuable; but little or no preparation of the objects for examination seems to have been made. Swammerdam was famous for his minute dissections, but no attempt, it appears, was made to preserve them. It is true Lieberkuhn in the early part of the last century mounted injected preparations on small discs of metal; these were afterwards covered with varnish, which dried with a convex surface. Slides of microscopic objects were also sold by Cuff, Adams, and other opticians: these were slips of ivory, about three-eighths of an inch in width, and three inches in length, in which four cells were made. The bottom of the cell had a narrow rabbet to prevent the small disc of talc upon which the object was placed from falling through: a second disc of talc was used as a cover, and secured in its place by a split ring. Some of these slides in our possession (sold with an Adams microscope made in 1757) contain the following objects:—Flea, louse, cheese-mite, wing of fly, foot of spider, feathers of butterfly, section of elder-pith, piece of muslin, leaf of moss (*Sphagnum*), mouse-hair, human hair, wool, silk, &c. Most of these are scarcely recognizable, and although mounted as transparent objects, are really not so; the flea, for example, had been simply killed and placed between the two discs of talc. Nothing, of course, but the outline, even in its best condition, could have been seen. Pritchard, as late as 1832, gives directions for mounting transparent objects in ivory sliders, and cautions the student against dusting the micas with anything but a camel's-hair pencil, and never to touch them with the fingers.

He further describes a new method of mounting minute transparent objects in brass sliders:—"Procure a piece of latin brass, about the thickness of note-paper, and cut off a slip the length of the intended slide and twice its breadth; then fold it down the middle, and make a small hole for the object. Now take a piece of talc a little narrower than the brass, and make a slit down the middle, leaving a portion uncut at either end, so as not to separate it; then put in your object, and fold it as you did the brass; lastly insert the talc thus folded between the sides of the brass, and pinch the latter close, and the slider is completed. As their size need not exceed that of the diagram—this is $1\frac{1}{2}$ inch long by $\frac{1}{4}$ of an inch wide — several of these sliders may be carried in a pocket-book, and are always ready to examine the merits of any instrument that may present itself."

The plan adopted for fluid-mounting would, we imagine, be far from successful. We are told to take a slip of glass, and spread a little white lead ground in oil, leaving an aperture in the middle to receive the object. This paint being laid on of the thickness of the object, the little pool or cavity is filled with weak spirits of wine; then lay in your object. Having cut a piece of talc the proper size, lay it on the top, and with a stick of wood rub it close down on the paint, beginning at one end and passing across the slider to the other, so as to exclude air-bubbles. Opaque objects were to be mounted on little discs of blackened cork.

The following directions how to perform a little bit of microscopic conjuring will perhaps interest some "microscopists." Procure a water-trough

similar to the one here represented, composed of two slips of glass cemented on each side of a plate of metal of the proper thickness, and of the form shown in the figure, the light part being that which is removed. If it is now filled with clean water, and the middle cell placed before the microscope (solar or gas) and a drop of the infusion containing the animalcules put into the cell *b*, on the commaud of the exhibitor the animalcules will commence marching across the field of view, and to those unacquainted with the plan it will appear in obedience to order, but which is merely their desire to spread themselves. In the same manner, when the cell *a* is full, *c* may be placed under the instrument, and the marching agaiu commence, the little animals only being able to pass from one cell to the other siugly."

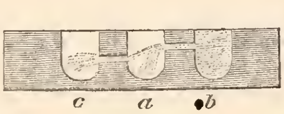

Fig. 156. Diagram of Trough for showing Migration of Infusoria.

Mr. Pritchard claimed the merit of the introduction of Canada balsam as a medium for mounting microscopic objects. Its value for this purpose, however, was not discovered until some time after the publicatiou (in 1832) of his "Microscopic Cabinet." In his "Catalogue," dated 1837, he mentions objects mounted iu balsam.

The followiug is a list of the prices of mounted objects:—

Case of transparent objects containing 40 slides, 7s. 6d.

Ditto 36 opaque objects, 7s. 6d.

36 opaque objects mounted on cylinder, 7s. 6d.

Objects selected from the list in sets, per dozen, 2s. 6d. to 18s.

Three sections of fossil woods, cut horizontally and longitudinal, showing the internal structure of plants, each from 2s.

About this time Ehrenberg commenced publishing his observations on the Infusoria, commencing with his Geographical Distribution of Infusorial Animalcules in North Africa and Western Asia, Berlin, 1828. In 1838 appeared his magnificent work, "The Infusory Animalcules as Complete Organisms," published in 2 volumes folio, containing 547 pages and 64 coloured plates. In 1830 Agardh (C. A.) published his "Conspectus criticus Diatomacearum." M. De Brebesson published his "Notes sur quelques Diatomées marine, rare ou peu connues du Littoral du Cherbourg," in 1834.

In 1833 Kützing published several works on the Diatomaceæ and other Algæ. From that time to the present the microscope has been continually improved, until it has now become an instrument of precision worthy of a better employment than displaying arranged butterfly scales and Diatoms or Micro-Photographs.

In this brief history of the Microscope and Microscopic Work we have endeavoured to show what could be done by the very imperfect instruments employed by Leeuwenhoek, Hooke, Swammerdam, and other early observers.

We are apt to smile at the tests of fifty years ago, with lines as close as twenty in the thousandth of an inch, requiring a magnifying power of 350 diameters and an angle of aperture of not less than 55°! Every worker with the microscope must admit that infinite credit is due to the opticians for the improvements they are constantly making in objectives. Forty-four years ago an objective with an angular aperture of 55° and magnifying 350 diameters was, perhaps, more highly-esteemed than a modern glass of three times the angle of aperture, and possessing an amplifying power of 5,000 diameters capable of showing an object not more than $\frac{1}{120000}$ of an inch in diameter.

It is probable that we have now uearly reached the limit of magnifying power; and if the undulatory theory of light be true it must necessarily follow that no image can be formed of less diameter than half a wave length. We must, therefore, look for the more perfect correctiou of our lenses and improved methods of illumination, rather than increased magnifying power for the discovery of minute structure, and we shall then probably find that many of our previous opinions will have to be considerably modified. Before concludiug this series of papers we wish to correct one or two errors that escaped notice wheu revising the proofs:—in page 84, column 2, 5th line from bottom, read Culpeper; page 85, column 2, 23 lines from bottom, read 1668; page 86, column 1, line 13 from bottom, read fig. 44; column 2, line 2, insert fig. 47 after "diagram"; page 199, column 1, line 20 from top, for American, read Amician.

In conclusion I beg to thank those friends and correspondents who have from time to time given me valuable information.

A REPTILE VIVARIUM.

PERSONS who are fond of keeping snakes aud other reptiles alive are sometimes rather at a loss for suitable receptacles, especially if the capture or donatiou happen to occur unexpectedly. This was the writer's case about a year ago, on coming suddenly into possession of three fine slow-worms, when the following expedient was adopted, which answered so well that it is here described, as it may, perhaps, be useful to others on a similar occasion. Not having a vase or case unoccupied, I took a box, which had formerly held some groceries; its proportions were about 14 inches long,

10 wide, and 6 or 7 high; but any size would do that suited the dimensions and number of the intended inmates. Having removed the lid, the front and back of the box were cut down to the height of about three inches. Then, having marked the upper edge of each end in the centre, it was cut down, sloping each way from this mark, to the level of the reduced front and back, the resulting structure resembling a roofless house with two gable-ends. A thin lath, about an inch wide, was nailed along the upper edge of the front and back, outside,

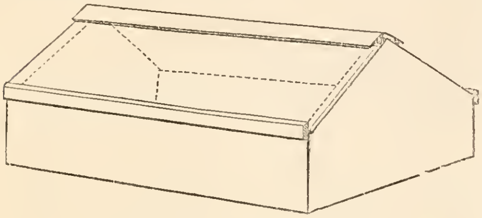

Fig. 157. Diagram of Reptile Case.

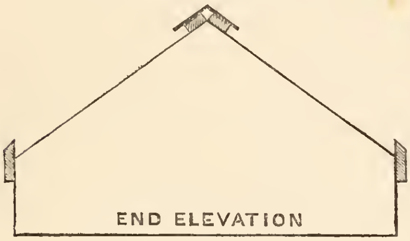

Fig. 158. End Elevation of ditto.

projecting a quarter of an inch above it. A strip of perforated zinc, two inches wide, and the exact length of the box, was bent along the centre like an angular gutter, and nailed from apex to apex of the gables to form a roof-ridge, two small squares of thin wood having been previously inserted under it at each end, to raise it an eighth of an inch from the gables. Two plates of glass were cut the length of the box, and slid in from the ends, being just wide enough to be retained by the overlapping edge of the zinc ridge above and the lath below. This completed the arrangement, which, of course, might be ornamented by nailing on bark or cork and fir-cones, &c. The perforated zinc affords ventilation, which could be increased by holes in the ends, similarly covered. The glass slides can be instantly and entirely withdrawn for cleaning, &c., or merely opened sufficiently to introduce a fly. The view of the interior is remarkably clear and distinct, the sloping roof not throwing back the light of the sky into the eyes of the observer, as a flat glass cover is so apt to do. If required for aquatic reptiles, of course a pan or square zinc trough might be introduced.

George Guyon.

NOTES ON THE FLORA OF BROCKENHURST, HANTS.

It is probable that the county of Hants possesses a flora as rich and varied as any other county in England, at any rate it is pretty certain that the New Forest and the parts immediately adjacent would, if all the plants were carefully catalogued, furnish a list numerically greater than any district of a similar area in the United Kingdom. The author of the chapter on Botany, included in the recently-published second edition of the "New Forest Handbook" (an excellent little guide which I strongly recommend all intending visitors to obtain), says:—"There is probably no district in England where, within the same limits, so many wild flowers are to be found as in the New Forest and its immediate neighbourhood. This is owing to the variety of soils. On the south, along the seashore at Mudeford, in the Beaulieu estuary, and by the Southampton Water, we have a greater variety of maritime flora than can be found in any other part of the kingdom. The Vale of the Avon is rich in river herbs beyond all valleys. A few miles beyond the Avon we come upon chalk, and all the plants peculiar to it. On the north, and here and there in the Forest, we have many of the clay plants; while the Forest itself is rich indeed with a lovely assortment of flowers delighting in sand and gravel, or peat and bog." A few species of flowering plants have their sole British habitat within the boundaries of the Forest, and many which are but sparingly distributed over the country are here, if not absolutely abundant, at least sufficiently plentiful to dispel any fear of possible eradication at the hands of ruthless and selfish collectors. And it is more than likely that some future diligent and persevering botanist, exploring the dark recesses of a pathless wood, or the treacherous surface of a spongy bog, may discover the habitat of some floral gem, perchance "new to Britain," which till that time had been "born to blush unseen," save by the eyes of those unconscious of its worth. May we hope that should such be the case, the fortunate discoverer will not be too anxious to make the precise locality generally known.

It is almost a matter of surprise, that among the thousands of excellent papers and valuable contributions which compose the twelve volumes of Science-Gossip, those on the fauna and flora of the New Forest should be so very few and far between. In view of this, I am induced to write a few notes on some of the less common wild plants which I have found during the present year in the vicinity of Brockenhurst; notes which, though perhaps not of much value in themselves, may have the effect of eliciting communications on the subject from the pens of much abler and more experienced botanists.

I must premise, however, that as I do not devote my time exclusively to the study of botany, my observations are not so extensive as they might otherwise be; and also that, except where the distance is specified, all the plants enumerated I have found within a radius of about three miles from the village of Brockenhurst, chiefly on the south side.

The two Lungworts (*Pulmonaria officinalis* and *P. angustifolia*) grow pretty commonly in our copses, and strikingly pretty are their deep violet blue corollas when the ground is begemmed with primroses, wood-anemones, and pileworts. I saw a fully-opened flower of *P. officinalis* as early as the 29th of March. The Columbine (*Aquilegia vulgaris*) with "horn of honey" is more generally distributed, though less plentiful. It is a handsome flower, and well worthy of the place it holds in cottage gardens, sometimes side by side with the Rosebay Willow Herb (*Epilobium angustifolium*) which I have seen wild only in one spot, growing with the foxglove among the tall bracken. The Common Gromwell (*Lithospermum officinale*) I only met with once on the edge of a little forest path. The Nettle-leaved Bellflower (*Campanula trachelium*) grows in a wood between this and Boldre, and the Ivy-leaved (*C. hederacea*) in profusion near Alum Green. In the genus Scutellaria, the general order of things is reversed; the Lesser Skullcap (*S. minor*) being far more common than its larger and handsomer relative (*S. galericulata*). I do not know more than half a dozen localities where the latter grows, and, with one exception, always in very small patches; but *S. minor* flourishes wherever there is the least moisture, and its little pink blossoms are among our commonest waterside flowers. Almost as plentiful are the Loosestrifes (*Lysimachia vulgaris* and *L. nemorum*), but *L. nummularia* is much less frequently found. On every boggy heath we have the bushy fragrant Forest Myrtle (*Myrica gale*), the golden Bog Asphodel (*Nartheciam ossifragum*), the delicate Bog Pimpernel (*Anagallis tenella*) and two of those curious insectivorous plants, the Sundews, *Drosera rotundifolia* and *D. intermedia*, the former abundant, the latter more sparingly intermixed with it. In July I found two specimens of the Pale Butterwort (*Pinguicula lusitanica*), growing close together, at the edge of a rivulet running through a thick wood some two miles from here, and about five miles east of Hincheslea Bottom, which Mr. Wise mentions as "perhaps the easternmost station known" for this species. Both species of Reed Mace (*Typha latifolia* and *T. angustifolia*) grow in this neighbourhood, and so do the White Water Lily (*Nymphæa alba*), the Yellow Water Lily (*Nuphar lutea*), the Buckbean (*Menyanthes trifoliata*), the Greater and Lesser Water Plantains (*Alisma plantaga* and *A. ranunculoides*), the Nodding Bur-marigold (*Bidens cernua*), and the Unbranched Bur-reed (*Sparganium simplex*). The Branched Bur-reed (*S. ramosum*) I have not found nearer than Holmsley, distant some six miles. Of St. John's Worts, six species are more or less common: *Hypericum androsæmum*, *H. quadrangulum*, *H. perforatum*, *H. humifusum*, *H. pulchrum*, and *H. elodes*. Of the Speedwells I have found eleven species, including *Veronica buxbaumii*, of which I discovered a small patch in blossom in August, and *V. polita*. The Navelwort (*Cotyledon umbilicus*) abounds on every hedgebank in this neighbourhood, and may be seen now and then vegetating on a decayed stump. The Lesser Periwinkle (*Vinca minor*) grows in profusion at Sway, a couple of miles from Brockenhurst, where I have also found the Round-leaved Toadflax (*Linaria spuria*). The Dwarf Furze (*Ulex nanus*) grows in many parts of our heaths; the Daffodil (*Narcissus pseudonarcissus*) in a few places, and the Small Snapdragon (*Antirrhinum orontium*) is a common weed. I conclude with my list of Orchidaceæ, which is not large, but which I insert for what it may be worth: *Habenaria bifolia*, *Orchis morio*, *O. mascula*, *O. ustulata*, *O. maculata*, *Gymnadenia conopsea*, and *Listera ovata*.

As far as I know no better list of the flowering plants of the New Forest exists than that contained in Wise's "New Forest: its History and Scenery," published in 1867,—but for several reasons this list is not satisfactory. When we find the localities of certain plants specially indicated, leading us to suppose that those are their only habitats, while, as a matter of fact, they are found elsewhere in the Forest more or less commonly, *e.g.*, *Cotyledon umbilicus*, "Road from Redbridge," "Dragon Lane, Bisterne;" *Scutellaria galericulata*, "Chewton Glen;" "Beckton Bunny;" (*Antirrhinum orontium*), "Milton and Somerford;" (*Typha angustifolia*), "Ponds at Wootton," and others, such as *Campanula trachelium*, *C. hederacea*, *Veronica polita*, and *Linaria spuria* omitted altogether (with respect to all which *vide supra*), we are constrained to believe that the list is far from complete and scarcely reliable. Not that the compiler is to blame; he probably made it (comprising some 650 species) as perfect as he could for those districts with which he was best acquainted, and he expressly states that it is "not by any means put forward as exhaustive," but the Forest is a field too wide to be undertaken by any one single-handed, be he ever so acute an observer and learned a botanist; whereas, if a few botanists stationed at various parts were to unite and set to work to carefully catalogue the species of their respective localities, in a few years a really useful and reliable list would have been compiled. The same remark applies with regard to other branches of Natural Science.

It is much to be regretted that a New Forest Natural History Society is still a desideratum.

Surely, there must be residing in this part of the county a few naturalists, botanists, and lovers of nature generally who would be willing to join together and form a Society, having for its object the study of the fauna and flora of one of the most interesting, and, for its size, least known districts in England. I would most willingly co-operate and assist in the formation of such a society, and I shall be glad to have the views of any persons interested in the subject, either through the medium of this journal or by letter.

Brockenhurst. E. D. Marquand.

F. H. WENHAM'S NEWEST BINOCULAR ARRANGEMENT FOR THE HIGHEST POWERS.

As that excellent binocular arrangement for low powers devised by Mr. Wenham in 1860, and which has not yet been superseded by a better one, yields only a well-illuminated field with objectives of no shorter focus than the half-inch of 40° angular aperture, owing to the shortness of the focii of high powers, great efforts have been made in devising and perfecting binocular arrangements suitable for the highest powers of the microscope. Stephenson's stereoscopic binocular, Powell & Lealand's patent non-stereoscopic, and several stereoscopic and non-stereoscopic binocular arrangements of F. H. Wenham and others, most of them requiring special bodies, have been devised, and have given more or less satisfaction.

Messrs. Ross & Co., London, supplied me in August last with a new binocular arrangement for the highest powers, which I have used since then; and as this is the first of its kind made, and as I cannot speak of it but in terms of unqualified praise, I beg to call the attention of all those engaged in prolonged observations under high and the highest powers to this ingenious invention. It appears that this new arrangement was devised by Mr. Wenham some years ago, but the apparent difficulties of making it delayed its being carried out earlier. This high-power binocular arrangement consists of two small superposed prisms of crown glass, fastened into a frame which fits in the place of the Wenham prism, for which it can be instantly exchanged. Through the courtesy of Mr. Wenham, who made this first prism himself, I am enabled to give a diagram of it. The larger prism (*A*) resembles in form and size the well-known Wenham binocular prism. The angle formed by the lower horizontal surface and the plane *p* is 40°, which is beyond the limit of total reflection, consequently a ray passing into the prism (*A*) is only partly reflected; but to enable the transmitted part of the ray to pass into the eyepiece, another prism (*B*), having also an angle of 40°, is placed above *A*, which renders the upper and the lower surfaces parallel to each other. The transmitted part of the ray now passes straight through the two prisms, as if simply a piece of plate-glass was interposed. The remaining part of the ray from the object-glass is intercepted by the two inclined surfaces, which have as much obliquity as can be given for transmission, and the amount of light reflected by the combined surfaces is consequently nearly equal to that transmitted, and, on account of

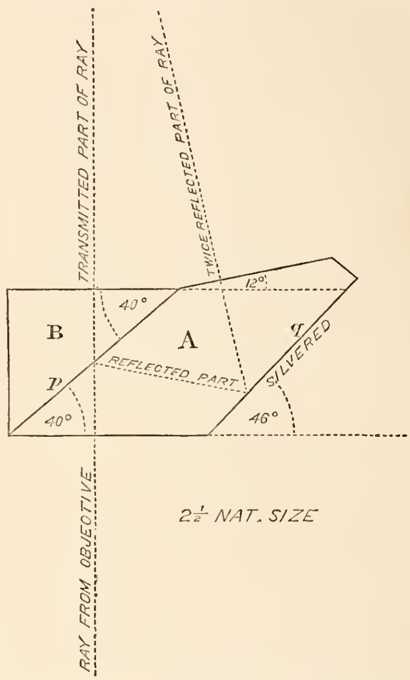

Fig. 159. Diagram of F. H. Wenham's newest high-power binocular Prisms, with angles, for Ross & Co's microscope.

their proximity, the reflected images of the two surfaces are combined as one. This reflected image is finally reflected up the inclined body from the plane *q*, just the same as in the low-power binocular; but as it is not possible to arrange this last surface within the range of total reflection, it requires to be silvered.

This arrangement acts non-stereoscopically, *i.e.*, it reflects identical images into both oculars; and its chief advantage consists in the relief it affords to both eyes. This, however, is a most important point when prolonged investigations are to be made, as, for example, such marvellous researches in the life history of the lowest forms of animal life as were made by the Rev. W. H. Dallinger, V.P.R.M.S., and Dr. Drysdale, which extended without interruption for months, and which to a large extent overturned the theory of spontaneous generation, would probably never have been made but for

the assistance of that relief granted by binocular vision.

Wenham's new arrangement produces some stereoscopic effect in the mind of the observer by the mere fact of binocular vision, and this is so decided, that many who have seen it declared it to be stereoscopic. This new combination of prisms performs equally well with all powers from a half-inch to the one-fiftieth of an inch inclusive; but with low powers, for which it is not designed, the effort is painfully flat to those accustomed to the splendid stereoscopic effect of the Wenham low-power prism.

As I have seen the markings in *Surirella gemma*, *Navicula rhomboïdes*, *Navicula crassinervis*, *Frustulia Saxonica*, &c., distinctly in the supplementary body, I cannot but pronounce the reflection of this new arrangement to be almost perfect. Of course there is a slight difference in the brightness of the images of the direct and the supplementary body; but as the left eye is generally more sensitive to the effects of light, this difference in brightness is not felt. The more powerful the light, the more the two fields are equally illuminated. Using that *ne plus ultra* of a microscope lamp—the Dallinger Lamp, a most useful accessory, which has a wick 1½ inch broad,—the difference in brightness of the two fields is scarcely perceptible, and with sunlight modified it disappears altogether.

I exhibited this new arrangement at the conversazione given by the Philosophical Society of Glasgow to the members of the British Association on 7th September last; and although I showed the cyclosis in so opaque an object as the leaf of *Anacharis alsinastrum*, under the one-fifteenth objective, using a lamp having a wick only half an inch broad, all those who saw it will grant that the performance left nothing to be desired.

I hope that the time has come when no optician will send out a binocular-stand without having a binocular arrangement for the highest powers. Messrs. Ross & Co., I believe, have not advertised these new high-power binocular prisms, for fear of creating a demand which they would have the greatest difficulty to supply; but I trust that they will at once make arrangements to produce them on a larger scale, so that the comfort and luxury of binocular vision under the highest powers may no longer be denied to those who have to do without it in the mean time. By the withdrawal of the prisms the microscope is instantly converted into a monocular one.

ADOLF SCHULZ.

"TROPICAL AFRICA and Southern Asia (and *Lemuria*) are those portions of the earth which deserve the first consideration in the discussion as to the primeval home of the human race."—*Haeckel's "History of Creation."*

THE MISTLETOE AND ITS ASSOCIATIONS.

THE oldest specimen of mistletoe I have seen noticed is that mentioned in SCIENCE-GOSSIP, April, which "appears to be about fifteen years old." Are there any recorded instances of the plant living to a greater age than this? We can hardly suppose this is the oldest. In the Kew Museum are specimens of apple-tree, &c., in which the parasites having died and decayed "before the stock upon which they grow, and have left curiously-furrowed moulds or casts answering to the space occupied by their attachment." Have any fossil vegetable parasites been yet discovered? It is not probable that they have appeared during the present era. To what age do the leaves live? The shrub is evergreen, but the leaves may be only annual. Hooker, in his "Students' Flora," gives the geographical distribution of this plant thus:—"Europe, N. Asia." It is said not to be a native of Scotland, Ireland, or the Channel Isles. In all these places Druidical remains are frequent, and from Ireland, at least, the Druids would be unable to attend the great annual meeting at Avalon, and would have to conduct their New Year's ceremonies themselves. How did they do this without the mistletoe, or must we suppose that it has become locally extinct since that time? In the "London Catalogue" it is mentioned that it is found only in thirty-eight of the 112 botanical counties into which Great Britain is divided. The allied species, *Loranthus Europæus*,—whose frequent habitat is the oak, and which is considered by some to be the true plant venerated by the Druids,—is said to be plentiful in all European countries in which the Druidic religion has not been prevalent, and to have been exterminated elsewhere. Does this plant extend to the snow-line on the mountains and plains, or how near does it approach it? What are the largest plants on record?

I have been unable to find sufficient chemical analyses of this plant to make their comparison interesting. It would be very interesting to inquire whether the ash varies in plants taken from the same support in different localities, and from different ones in the same locality. We should probably find some instructive differences in the constituents of the ash. I can only add to the lists of support plants already given in SCIENCE-GOSSIP three fresh names. In Hooper's "Medical Dictionary" the hornbeam (*Carpinus betulus*) is given as an occasional habitat; in another work the sycamore is given (? *Acer pseudoplatanus*); and in Decaisne and Le Maout's "General System of Botany" it is mentioned that it even attaches itself to *Loranthus Europæus*, which is itself parasitic upon oaks! In two or three works the mountain ash is mentioned as a habitat; and in Loudon's

"Encyclopædia of Plants" its abundance on *Pinus sylvestris*, near Magdeburg, is noticed.

It seems to produce a premature aging of the whole tree on which it grows, and the particular branch which supports it soon gets withered and dead. This becomes an economical question in cider orchards. To a tenant the growth of mistletoe on his trees is an advantage, as he gets the benefit of age in producing a larger crop of smaller and sweeter apples, more suitable for cider-making. To the owner this is a short-sighted policy, as it causes the premature aging and decay of his trees, and the same quality of fruit can be produced by skilful pruning.

The plant is diœcious, having somewhat conspicuous flowers, the male ones possessing a strong honey-like odour. Hence it is evident that it must be fertilized by insects. As the berries are almost invariably formed, this fertilization must be frequent. In many books it is said to be indebted to a moth for the performance of this office, but the species (if only one) is not mentioned. In a paper in the *Gardeners' Chronicle* it is said that bees are attracted by the smell of the male flowers in its season. Lubbock, in his excellent little book on British wild flowers in their relations to insects, does not mention the mistletoe at all. The anthers have their faces curiously punctated, and are attached to the perianth; I have seen no mention of honey-glands, nor have I ever been able to examine the flowers, so cannot say if the honey is accessible or not. If the plant is dependent on one species only for its fertilization, that species must be a frequent one, and have a large range.

I have not heard of its being the larval food of any insect, nor of any species of aphis dependent on it.

The plant seems to be indebted to *birds* for all its natural propagation. The berries are said to be greedily eaten by many birds, and the seeds to pass through the stomach without digestion. Many writers of the eighteenth century disputed this fact. One says that birds would not eat what they could not digest; and if they did so, the seeds let fall in their dung upon the trees would always grow from the upper side, whereas we find the mistletoe at all inclinations with the bough. Relating to this idea and to the use of the berries in making birdlime, is a Latin proverb, occurring in several forms, one of which is as follows:—"Tardus sibi malum cacat." I must leave its translation to your readers. One author says of the mistletoe, "And this is the nature of it: unless it be mortified, altered, and digested in the stomach and belly of birds it will never grow."

The earliest name I have been able to find for the mistletoe is the Celtic *guid*, meaning "the shrub" *par excellence*. The present French name, *gui*, is evidently a direct descendant of this. In Hooker and Arnott's "British Flora" the Greek name for this plant, written variously, *Iks*, *Iksos*, and *Iksia*, is derived directly from the Celtic *guid*, though perhaps the derivation is somewhat strained. It is probable that the words are related in some way, but we must trace each back to its antecedents before the connection becomes self-evident. The forms of the Greek name *Iksos* in the Æolian dialect are *Biskos* and *Fiskos*; and this last at once brings out the relation between the Greek and the Latin names *viscus* and *viscum*, and with the modern Italian *vischio*, the Portuguese *visgo*, and the Spanish *hisca*, which are evidently lineal descendants from the same. Here, however, the chain stops, and we take up in *gui*, the French name, a link much closer to the Celtic *guid*. Further north we are introduced to a name which seems to have no relation to the southern name. The German, Danish, Norwegian, and Swedish name for it is *mistl* or *mistel;* the Anglo-Saxon is *mystelto* or *mysteltan;* and the English mistel, mistleto, mistletoe, misleto, misletoe, miseltoe, misseltoe, misselto, missel-toe, misleden, misselden, misseldine, and missendine, of which the form, mistleto, seems to be most generally adopted in modern time.

The various derivations of this name were given recently by "R. M.," and I would only add that Prior's derivation from *mistl*, different, and *to*, a twig, seems much the most plausible and satisfactory.

Other names for this curious shrub, the relations of which I am quite unable to trace, are the Spanish *liga*, Russian *omeia*, Polish *jerniel*, and the Dutch *marentakken*. The Italians are said also, from "its extraordinary virtues, too many to enumerate," to call it *Lignum Sanctæ Crucis*, the wood of the Holy Cross. The mistletoe of the fir and larch was distinguished in Greek by the name *stelis*, which was also adopted in the Latin. The word *viscus*, if it can, as seems probable, be traced up to and past the Celtic *guid*, a shrub, must have got its evident connection with viscidity from its application to this shrub; so that the general derivation of the name from viscid, or sticky, is an anachronism. It is easy to understand how the word *viscum*, from meaning originally the shrub, should come to mean sticky and glutinous, from one of the most obvious peculiarities of the shrub.

The name *viscus*, or *viscum*, received in the seventeenth and eighteenth centuries many distinguishing epithets. Thus, Browne in his "Vulgar and Popular Errors," calls it *Viscus arboreus;* Linnæus, before the introduction of the binomial system, *Viscum, foliis lanceolatis, obtusis; caule dichotomo; spicis axillaribus*,—thus thoroughly realizing his ideal that a name should be a concise description of the thing named. After the invention of the binomial system of nomenclature the mistletoe received the name *Viscum album*, which

it now bears. Before that it had borne the names of *Viscus quercus*, *Viscum quercinum*, *Viscum baccis albis*, &c. The name mistletoe has shared the same fate, being further distinguished as white missel-toe, mistletoe of the oak, &c. In an old German-Latin-French dictionary, the German *mistl* is made equivalent to the Latin *viscum* and the French *glu*. Where this name is to come in I do not know.

The old Druidic names for the mistletoe were expressive of their veneration for it, thus Pren puraur,* the tree of pure gold; Pren awyn, the ethereal tree; Pren uchelvar, the lofty tree; and Mr. Davies, in his "Rites and Mythology of the British Druids," mentions that there are four other names, compounded of Uchel, lofty, but he does not record them. The Welsh, Breton, Erse, Gaelic, and Channel Island names for the mistletoe would doubtless throw some light on those mentioned here. Would some correspondent kindly supply them?

The "Prose Edda," the sacred book of the religion of Odin and Thor, contains a legend given under the name of the *Misteltheinni Voluspa*, which is *perhaps* the earliest notice of the mistletoe we have, as it has evidently been traditional for centuries before it was committed to writing. It is the legend of the death of Baldur. Baldur, one of the sons of Odin—the fairest, the wisest, and best of all the inhabitants of Valhalla—was troubled with dreams that his life would be suddenly cut short by some painful death. The gods set themselves to prevent this dread calamity; and Freya, the mother of the gods, obtained from all things—earth, air, fire, water, metals, weapons, &c.—a vow never to hurt or injure Baldur in any way. But the mistletoe was at the time forgotten, and afterwards thought too insignificant to be feared. This pledge was so powerful that from that time Baulder was accustomed to make sport for the gods by standing in their midst, and allowing them to try their most deadly arts and weapons upon him, always without effect. Loki (fire, or the spirit of mischief), jealous of this power of Baldur's, extracted from Freya the fact that the mistletoe had been overlooked, and the oversight not afterwards repaired. He hastened to the woods, pulled the mistletoe, and selecting the strongest branch, he fashioned of it a dart slender and keen. Going into the circle of the gods while at their usual play, he invited Hod the Blind (the type of the blind forces of Nature) to fling at Baldur the little dart he had prepared. Hod does so, and directed by the hand of Loki, the dart made from the insignificant mistletoe pierces Baldur's eye to the brain, and he falls a corpse! Great was the lamentation in Valhalla. Sir Walter Scott's translation of the whole Edda is to be found in "Mallet's Northern Antiquities," published by Bohn; in Schow's "Earth, Plants, and Man," by the same publisher; and in an early volume of "Good Words for the Young." It is full of interest, and will well repay a perusal.

A curious and very interesting remnant of this legend is found in the north of Germany at the present day. It is there believed that a man provided with a piece of mistletoe can never be wounded, while his own weapons cannot fail to take effect. It is well known that the mistletoe was held in great esteem by the Druids; its very names in their tongue are a sufficient evidence of this, and the writings of their bards and other remains have a frequent reference to this. It doubtless owes its celebrity to its close connection with the oak, which was their chosen symbol for Huon, their chief deity.* This close connection with the oak, its mysterious growth, totally unlike the tree on which it grows, its birth sudden and apparently without cause, all combined to impress such accurate observers as the Druids undoubtedly were with a sense of mystery and awe. Add to this, that, as Vallancey says, "Not only its berries but its leaves also grow in clusters of three united to one stock" (three, the sacred and universal number almost all the world over!), and we can understand in some measure how it came to acquire its great importance, and how there came to be ascribed to it such manifold, diverse, and miraculous properties.

The ceremonies of gathering the mistletoe were among the Druids most impressive, but are too well known to need enumeration here. They were performed on New Year's Day, and portions of the gathered mistletoe "were distributed to the people throughout Gaul because of the great virtues which they attributed to it," from whence New Year's Gifts are still called in some parts of France *gui l'an neuf*. In Worcestershire, up to the present time, the ceremony of hanging up a new branch of mistletoe is annually performed at 12 p.m. on New Year's Eve. The old branch, that has hung the year through, is given to the first cow that calves after New Year's Day, to ensure luck to the dairy throughout the year. In Herefordshire the only variation in this ceremony is that the old branch is burnt.

The Druids are said to have believed that the mistletoe was the retreat of the sylvan deities during the winter, when there was no other shelter for them in their favourite wood. We seem to have some trace of this belief in the custom of burning the old branches not only of mistletoe but

* Virgil's *Aurum frondens* and *Ramus aurens* are this plant. Note also the close resemblance between the Druidic Puraur and the Latin *Purum aurum* (pure gold).

* Huon, according to Mr. Bryant, was none other than the patriarch Noah, invested with various characters as the Hemarkite god. He refers nearly all the heathen gods and goddesses to Noah in his different characters.

of all Christmas household decorations. Herrick, in his "Hesperides," makes this a Candlemas (Feb. 2) ceremony. And in Holstein and the neighbouring districts it is believed that any one holding a piece of mistletoe in his hand will have the power of seeing spectres.

The date of its use has, however, changed in the greater part of Britain from New Year's Day to Christmas. Coles, in his "Art of Simpling," 1656, says, "It is carried many miles to set up in houses at Christmas time." What would Master Coles have said to the following clipping from the *Malvern News* of 1860?—"The Hereford papers tell us *tons* of mistletoe have been despatched from that city *by rail* to London; and, as we know, lots of barrels filled with the same mystic plant go every year northward from Worcester for the merry maids of the black country and for the Lancashire witches." Christie, in his "Enquiry into the ancient Greek Game supposed to have been invented by Palamedes," says, page 131, "We find by the allusion of Virgil, who compared the golden bough in Infernis to the mistletoe, that the use of this plant was not unknown in the religious ceremonies of the ancients, and particularly of the Greeks."

The use of the berries for birdlime is mentioned by "F. M."; but there seems to be great diversity of opinion as regards its qualities among old writers,—a trivial but curious matter. One says that it is the best, far superior to that made from holly-bark; and another says that it is inferior to the latter. Directions for making it from these berries are given in Miller's "Gardener's Dictionary." The berries are to be boiled in water until they burst; they are then to be well beaten in an iron mortar and thoroughly washed till the branny husks are separated from the birdlime. This birdlime is said by Dodonæus to be poisonous. Gerarde gives a list of the uses of the plant, which is copied almost verbatim by Culpeper, with the addition of a quotation from Clusius to the effect that a piece hung about the neck prevents witchcraft, and a notice of its power in epilepsy or the falling sickness. This use of the plant in epilepsy is the best known, but seems to have taken its rise within a comparatively recent period, as in Gerarde's "Herbal" (Johnson's edition, 1636). there is no mention at all of its use in this way,—a strong presumptive proof that it was unknown In the 18th century this use took its rise, and we find it in the Edinburgh Pharmacopœia for 1744 in a *pulvis antiepilepticus* composed of dittany, peony, valerian, and mistletoe of the oak, equal parts. It was omitted, however, in the Edinburgh Pharmacopeia published in 1792, and does not seem to have been readmitted. In Beasley's "Pocket Formulary" are given two French receipts for the same purpose, each containing mistletoe, but their date is not given. I find it also in the Prussian Pharmacopœia for 1799, and in a French Manual of Pharmacy published in 1803. In Hooper's "Medical Dictionary" I find the following account of its rise, progress, and decline in medicine:—"The *Viscus quercinus* obtained a great reputation for the cure of epilepsy, and a case of this disease in a lady of quality, in which it proved remarkably

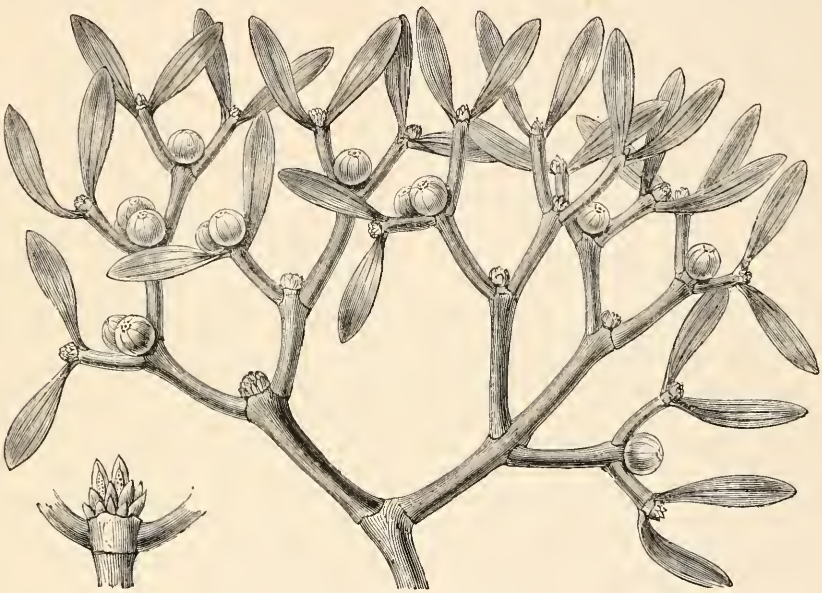

Fig. 160. The Mistletoe (*Viscum album*).

successful, is mentioned by Boyle. Some years after, its use was strongly recommended for various convulsive disorders by Sir John Colbach, who has related several instances of its good effects. He administered it in substance in doses of half a dram, or a dram of the wood or leaves, or in the form of infusion. This author was followed by others, who have not only given testimony of the efficacy of the mistletoe in different convulsive affections, but also in those cases denominated nervous, in which it was supposed to act as a tonic. But all that has been written in favour of this remedy has not prevented it from falling into general neglect, and the British College of Physicians have perhaps not without reason expunged it from their catalogues of the Materia Medica." It is a sufficient commentary on the above to remark that it is not to be found in any British Pharmacopœia or work on Materia Medica of the nineteenth century. A few more stray uses only remain to be mentioned. In Tusser's "Five Hundred Points of Good Husbandry" occurs the following couplet, the meaning of which I do not know:—

> "If snow do continue, sheep hardly that fare,
> Crave mistle and ivie for them for to spare."

Among the Druids it was a cure for barrenness. They called it Allheal, and prepared from it a beverage that cured all diseases and resisted all poisons. "Wore about the neck by children to prevent convulsions and ease their teeth; many have thought children to be the better for it, and they certainly were never the worse."—Quincey, 1729. The berries are said to be very purgative. It is "used to protect our homes from evil spirits." In Herefordshire Dr. Bull says it is a common practice to give it to cows after calving, and to sheep after lambing. That from the hawthorn or maple is considered to be the best for cows, and Sir Thomas Browne mentions this as a common country practice in his time.

In some parts of France it is believed that the mistletoe applied to the stomach is an effectual remedy for all kinds of poisons; and in England it is still regarded in some parts as a protection against witchcraft. Another French superstition is that if a branch of the mistletoe be hung up in a tree with the wing of a swallow the birds will fly to it from the distance of two leagues.

The plant itself is curious in many respects. The following are a few:—The seed frequently contains two or even three embryos. It has a rhizomatous root, which, without actually uniting with the stock on which it grows, has a very close connection with it. It was formerly supposed to be a mere excrescence from the tree, caused by a superfluity of sap. In the *Gardener's Chronicle* the variability of the plant is mentioned—a form with branches radiating, leaves recurved and shortened (male); specimens with branches short, compact and bushy; others with long, lithe, and flexile branches, the colour varying also from deep green to bright yellow, are recorded: "One of the most remarkable varieties we have met with was one in which the male and female flowers occurred on the same bush. The stamen bearing flowers were borne on long, slender, whiplike branches, with broad, yellowish leaves. The female flowers were on short, stiff branches, with small, narrow, deep-green leaves."

P.S.—I find in the *Gentleman's Magazine*, Feb. 1791, that the mistletoe in Welsh is called Guidhel. Has it any other name in that language?

W. G. P.

MICROSCOPY.

A New Method of Mounting Microscopical Objects.—Professor H. L. Smith, of New York, in a paper communicated to the Quekett Club, recommends the following plan where cells of a moderate depth are required. These cells are made out of sheets of wax, such as are sold for the purpose of making artificial flowers, and can be obtained of various colours. The black wax is perhaps the best for mounting foraminifera and other opaque objects. The following are the author's directions for preparing the cell and background. A disk of wax rather larger than a brass curtain-ring is attached to a slip by means of warmth. The ring is pressed into this and centred by the turntable, and then again pressed fully home, showing the brass when looked at from the under side, and the whole finished with the usual "Brunswick black" outside and the ring inside. To attach the foraminifera or other objects, a minute drop of turpentine is applied to the wax, and in a minute or so, before it is quite dry, the object is placed on the softened wax. When thoroughly dry it will be found so strongly attached that a violent blow or fall will not dislodge it. The cover should be of just such a size as to rest not on the top of the ring, but to slip just within, so that its surface may be flush with the top of the ring, and kept in its place by a ring of black varnish. For mounting transparent objects the centre of the wax disk must be punched out, leaving a ring of wax. This is attached to the slide, as before described, and the cover, with the object upon it, is placed upon the ring, and fastened thereto by passing a heated wire round it. For mounting foraminifera the wax-bottom cell cannot be surpassed; indeed, no one who has used it will return to paper or any other substitute. For further particulars as to the method of making these cells, we refer our readers to the September part of the "Journal of the Quekett Microscopical Club."

NEW MODE OF MOUNTING OPAQUE OBJECTS.—At the receut meetiug of the Microscopical Section of the American Association for the Advancement of Science, Prof. H. L. Smith described his new method of mounting opaque objects, where it is desirable to cover them with thin glass. He takes a circular disk of thin sheet wax, which is easily cut with a puuch from the sheet wax ordinarily used for makiug flowers, and attaches it by means of heat to the centre of a glass slide. A brass ring, of which the interior is the same size as the disk, is then attached to the slide, and the object is fixed to the wax by slightly moistening the surface of the latter by a minute drop of turpentine. When dry, a cover which exactly fits into the bevel of the ring is attached with a little cement, and the whole may then be finished off on the turntable. The appearance is very elegaut, and the specimens are perfectly preserved.

DOUBLE STAINING OF MUSCULAR TISSUE WITH PICRIC ACID AND CARMINE.—In the *American Journal of Microscopy* George D. Beatty, M.D., writes to call attention to the muscular tissue of the tongue of the *Lissotriton punctatus*, the smooth-skin newt, and of the *Amphiuma tridactylum*, and to describe a mode of double staining with picric acid and carmine that is well known. "The muscular tissue of these two species of the order *Urodela* is deserving of notice on account of the well-marked transverse striæ, and very large sarcolemma cells or nuclei. These nuclei in the *Lissotriton* are oval; in the *Amphiuma* they are oval, but often very much elongated, some of the latter extending one-third across the field on using a one-fifth objective and A eyepiece. Iu staining with picric acid and carmine, the carmine is appropriated by the uuclei, while the picric acid is taken up by the sarcous elements and the perimysium. Picric acid causes the transverse striæ to come out more distinctly than any other dye. The tissue should be hardened by first putting into 95 per cent. alcohol, and afterwards absolute alcohol. Transverse sections are best obtained by cutting in a section machine; longitudinal fibres by carefully teasing out with needles before staining. The process of staining is as follows:—Remove the sections or small shreds that have been teased out to 25 per cent. alcohol for one minute. Place in Dr. J. J. Woodward's borax carmiue for five minutes. Soak about ten miuutes in alcohol acidulated with 20 per cent. of hydrochloric acid. This will in great part remove the carmine from other parts than the nuclei. Wash in alcohol for fifteen minutes to remove acid, changing the wash once or twice. Put for thirty or sixty *seconds* into an alcoholic solution of picric acid, one-twelfth of a grain to the ounce. Wash in alcohol, and put into absolute alcohol for fifteen minutes, and oil of cloves for the same time. Mount iu balsam. Other parts of the *Amphiuma* than the tongue afford beautiful muscular fibre, but with fewer nuclei; indeed, this batrachian is a microscopical treasure all through, as is our aquarium friend, the graceful *Lissotriton*. I am indebted to Dr. Christopher Johnston for the *Amphiuma* material I am fortunate iu possessing."

ZOOLOGY.

THE SLOW-WORM.—I have nowhere seen any account of the Slow-worm (*Anguis fragilis*) having brought forth its young in confinement, and have no doubt but some of your readers will be interested to know that I have this season had two broods, the parents having been iu my possession about two years. Last season they produced young ones, but all were dead at birth, or must have died soon after, as they had not freed themselves from the thiu skin-like shell in which they were coiled. This seasou they had emerged from the eggs when I found them, and could not have been many hours old at the time. They are now several weeks old, very lively and healthy, having grown about half an inch since their birth, and are a little more than three inches long, of a beautiful silvery greenish-grey on the back, having a dark line running from opposite the eyes, where it is slightly forked, to opposite the vent; the belly is black and glossy. In shape they only differ from the adults in the head being broader in proportion, slightly protruding opposite the eyes aud jaws. Their food is caterpillars and grubs, particularly the smooth kinds. Like all my pets, they are tame; and my method of taming all creatures is to handle them freely, pet them, and on no account to punish them in any way; give them food at regular iutervals, study their peculiar habits, and indulge them in anything you find they take pleasure. By this means I have had the chameleon, toads, mice, rats, birds of various kinds, and, perhaps, the most unpromising of all—a Lepidosiren (or Mudfish)—take their food from my fingers quite freely. At one time I was under the impression that such things were attracted by their food alone, and merely had to overcome their natural timidity, but I am now quite convinced that is not the sole attraction,—that there is an amount of affection, liking, or whatever you may please to term it, which, when once obtained, they will refuse their food to obtain your caresses. This was particularly the case with a chameleon I had in my possessiou about two years, and is the case with birds and a rat I have at this time. The latter is delighted at all times to leave its companions and mount my shoulders. When ou the ground, at the slightest alarm, it darts to my feet and scales the heights to its favourite security,

to my friends' disgust and sometimes alarm; but I like all such things, and I suppose that is part of the secret.—*J. Tyerman, Tregoney.*

The Locust in England.—A specimen of the true Locust was brought to me a short time since, and was found in a bean-field near Wells, Somerset. The species (*Pachytylus migratorius*) is identical with specimens in my cabinet from Australia and Egypt, and is very different from the large green grasshopper (*Acrida viridissima*) which is often found in this country. The specimen measures about four inches across the wings, which are of a greenish hue, the wing-cases and body being brown. —*H. W. Livett, Wells, Somerset.*

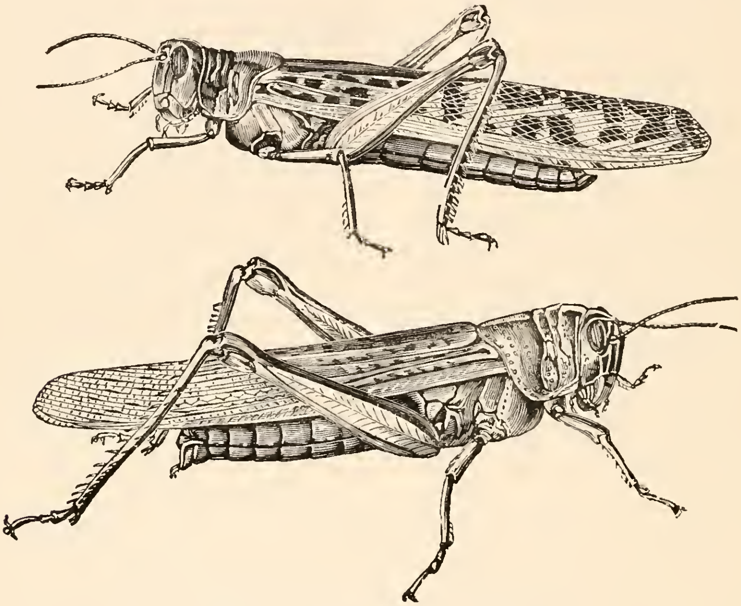

Fig. 161. The Locust (*Pachytylus migratorius*).

BOTANY.

Pittosporum Tobira.—In the observations on this plant in Science-Gossip for August last (p. 186), I stated that although I found it as an ornamental shrub at Folkestone, I had never seen or heard of it at Brighton, and that the nurserymen there thought the climate was too severe for it. I was agreeably surprised, on the 28th of October, to observe a fine specimen of the plant in a large flowerpot in full flower, with heads of flowers quite as large and as fragrant as those I saw at Folkestone in June last, in the front of No. 30, Hove Villas, Cliftonville, adjoining Brighton. It had been out in the open air, exposed to the severe weather all last winter in the spot where it now stands, without the slightest sign of having suffered from the frost, —a proof that it will thrive in this quarter. By making the fact generally known, all doubts as to its easy cultivation in any part of England will be set at rest; and there is every reason to suppose that this beautiful sweet-scented evergreen will in a short time become a general and pleasing addition to the evergreens of Brighton and the country generally by all admirers of ornamental shrubs. I understand the Pittosporum, as well as another evergreen, noticed at the same time in Science-Gossip, viz. the *Lonicera Ledebourii*, will shortly be introduced into Brighton.—*T. B. W.*

The Classification of Monocotyledons.—At the first meeting of the session of the Linnæan Society, held recently, Mr. George Bentham, F.R.S., the late President, presented a paper on the classification and nomenclature of monocotyledons. In the brief account he gave of the contents of his paper, he urged that in describing plants, care should be taken to employ terms that state facts and do not involve a theory as to what the parts described represent in other plants. He complained of the carelessness with which many writers indiscriminately employ terms. His new classification involves great changes. It was especially pointed out that external appearance is often misleading, and, for example, the Iris and the Lily in the new scheme

are widely separated, the *Liliaceæ* being brought into close proximity with the *Smilaceæ*.

Northamptonshire Notes.—Morton, in his "Natural History of Northants," published in 1712, mentions the richness of the old "delves" or quarries in good plants, particularizing Barnack Quarries, which were then the habitat of some "brave" species, including the Spider, and Bee Orchis, and *Anemone pulsatilla*. Dr. Bowles says, of Barnack, in the *Phyt. Brit.*, that this old stone-pit, now green, is as fine a place for rare plants as he ever beheld. So, encouraged by this and by some valuable MSS. notes supplied by the Rev. M. J. Berkeley and W. L. Jones, Esq., I recently walked from Wansford to Barnack and Stanford. I found the Southorpe habitat of the Spider Orchis, but, as Mr. Berkeley said, larch had been planted over the site, and no trace of it could be found, though the season was then not sufficiently advanced: however, by the grassy paths I came across the pretty *Astragalus hypoglottis*, *Carex præcox*, and by a still used pit, *Cynoglossum officinale*, *Echium vulgare*, *Lithospermum officinale*, *Erythrea centaurea*; near Ufford, on the railway banks, I found *Chlora perfoliata*, a very local plant with us (it has been found near Yardley Chase, on the drift, by Mr. Scriven). Near Wansford occurred *Anthyllis vulneraria*, *Rhamnus Frangula*, much rarer with us than *catharticus*; *Valerianella officinalis*, and *Schlerochloa rigida*. On the gained Barnack Heath, or Hills and Holes, I was at first terribly disappointed; but the glisten of the feathery carpels of *Anemone pulsatilla*, and then one in flower; then came *Aceras anthropophora*, *Antennaria dioica*, *Hippocrepis comosa*, *Astragalus hypoglottis*, *Carex præcox*; and on the walls in Barnack, *Geranium lucidum*. The walls of Walcot Hall were plentifully covered with *A. ruta-muraria*. I was apparently too early for the Bee Orchis and *Hypochæris maculata*. The rare *Senecio campestris* is also heralded from the vicinity. I might also add that *Cerastium arvense* was very frequent, and about Stamford *Reseda lutea* and *luteola* and *Cynoglossum officinale*. On the rail-banks at Wellingborough I found *Papaver hybridum*, and on Wellingborough Bridge *A. trichomanes*. Our field-day to Badby Woods yielded *Lysimachia nemorum*, *Equisetum sylvaticum*, *Melampyrum pratense*, *Vicia sylvatica*, *Lathyrus sylvaticus*, *Melica uniflora*, *Hippuris vulgaris*, *Scirpus sylvaticus*, *Carex pallescens*, *Polygonum Bistorta*, and abundance of *Nephrodium dilatatum spinulosum*, *Athyrius filix-fœmina*, *Lomaria spicant*. Recently in Whittlewood, while looking after the Purple Emperor, which was frequent there in 1874, I found *Carex pseudo-Cyperus* and *pendula*, and *Neottia nidus-avis*, but no butterfly. Recently in Northampton district I have gathered *Crepis biennis*, which was growing sparingly with *C. taraxacifolia*. As escapes may also be mentioned *Meconopsis cambrica*, *Euphorbia lathyris*, *Alyssum calycinum*, *Reseda alba*, *Polygonum fagopyrum*, *Dianthus plumarius*, and *Sedum rupestre*; the latter of which occurs in great plenty on the towing-path of the canal, near Stoke Bruerne; and Mr. Lewin has sent me *Sedum dasyphyllum* from Brigstock, where he has known it for twenty years.—*G. C. Druce.*

The Fertilization of Flowers.—During the hot weather a glass, containing a number of red poppies, mixed with specimens of the common blue scabious, was standing in my window. I noticed a large humble-bee fly up to the bunch, and dip into every poppy, scrupulously avoiding the Scabiouses. Subsequently, a common honey-bee arrived and visited all the flowers that his predecessor had omitted, but did not attempt to enter a poppy. Can any of your correspondents enlighten me as to whether humble-bees are particularly partial to the nectar of poppies, and wild bees to that of Scabious; or whether, in accordance with some law of Nature, bees always visit consecutively, different specimens of the same species of flower, in order to carry out more perfectly and certainly their fertilization?—*C. W. C.*

Symphytum tuberosum.—As to the time of this plant's flowering, so far as my observation goes, Mr. Douglas is correct. It usually commences flowering in this neighbourhood in the beginning of May. About Melrose, where it is plentiful, I have seen it in full flower in the second week of May. Typical *S. officinale*, as far as I am aware, does not grow in this district, so that I have no means of comparing them, but the purple-flowered plant (*S. patens*, Sibth.), which is usually considered a variety of *officinale*, and, according to Withering, flowering at the same time, is frequent, and widely spread over the district. It generally begins to flower about a month later, and continues flowering for a much longer time.—*A. B.*, *Kelso.*

White Plants.—The most lovely exhibition of white plants which has ever come before me occurred during the month of July of the present year. A field on the Oolite Sand sown with a mixture of Rye grass and Dutch clover, after being mown, soon became thickly-studded with *Erythrea centaurea*, large patches of which presented the usual bright pink flowers, which were intermixed by other patches of the same plants, the flowers of which were a bright silvery white. We found both varieties suddenly disappear, as the rustics had gathered it to make "yarb tay to strengthen the stumick." It is a fine bitter, and its infusion not only provokes appetite, but that digestion which one would wish to wait thereupon. "May digestion wait on appetite, and health on both."—*J. Buckman*, *Bradford Abbas.*

NOTES AND QUERIES.

The Nettle: its Uses.—The Kamschadales use fishing-lines made from the stalks of the nettle; they also manufacture a kind of coarse cloth and strong cordage from the same source; and paper has been made from the rind of the stems.—*Helen E. Watney.*

Northern Holy-grass.—May I be excused, with all respect for Professor Boulger, to remark that in his interesting observations on the *Hierochloë borealis*, page 162 of your magazine, he has not correctly quoted the statement made in my notes on the Holy-grass, Science-Gossip, page 177, of last year. In reference to the plant being hermaphrodite, my remarks are thus worded: "Upper flowering glumes smaller than the two lower ones and nearly glabrous, inclosing a still smaller one-nerved palea, or 'glume,' two stamens and the 'pistil,' which are hermaphrodite"; which means that both stamen and pistil are present and perfect at the same time. I do not say "mature simultaneously." Professor Boulger allows the grass to be *truly* hermaphrodite. Now, the word perfect, we presume, means finished, complete; mature means ripe. We infer that a plant may have each of its various parts complete, present, and perfect at the same time, without its fructifying parts being mature simultaneously. It has not been our privilege to watch the development of the *Hierochloë borealis;* but we know, that though the stamens and pistil are both situated in one flower, they are not mature at the same time always. These plants are called dichogamous. Sometimes, as in the Arum, the pistil matures before the anther, and these plants are called proterogynous; but much more frequently the anther matures before the pistil: and such plants are called proterandrous. We are indebted, I believe in the first instance, to Sprengel for the above valuable *discovery* of the phytology of some plants. —*E. Edwards.*

The Clouded Yellow Butterfly was very plentiful near Bath this year, but was almost, if not entirely, confined to two or three fields where a crop of clover had been grown among the stubble after the harvest. This is, I believe the first crop of clover ever grown in the field (as far as my experience goes), and *Edusa* has never, to my knowledge, been seen there before. How could this butterfly have been introduced with the clover, and would it have been so introduced in the caterpillar, chrysalis, or egg state? I took also a specimen of the *pale* clouded yellow in the same field, a butterfly, I believe, new to the neighbourhood. It is a curious fact that, though I caught (and released) some dozens of specimens of *Edusa* in order to obtain a female, I was unable to capture a single specimen.—*C. W. C.*

How do Crickets Feed?—A friend of mine lately found the young cucumbers in his hot-frame much gnawed, which he supposed was by mice, until, after a careful search he found, in the act of feeding, a cricket, about $1\frac{1}{2}$ inch long, and of a bright green colour. I have had the cricket in my possession about ten days, during which time it has not eaten anything, but is reduced in size to about $\frac{7}{8}$ of an inch, and is now changing its skin. I should be glad to know if it is usual for crickets to thrive in such situations, and if their colour depends on the nature of their food.—*T. E. W., 18th September,* 1876.

Gold-fish Breeding.—For about twelve months we have hadt wo gold-fish in an inverted propagating glass, fourteen inches in diameter. They are male and female, and on Sunday, August 27, the female began to deposit its eggs, the male pursuing it with the greatest fury, rubbing against its sides, and at times almost pushing it out of the water. The eggs were laid singly, at times two or three holding together, the male devouring them with the greatest avidity; so much so that we had to take them out that we might see whether they would hatch or not. On the third day those that contained young showed with a magnifier a black spot for the eyes, and a dark band for the backbone, which was moved every few minutes from the sides to the top, and then back again; while the addle eggs were opaque and covered with conferva. On the eighth day we saw the first young one, about $\frac{1}{8}$ inch long, wriggling in the water like a tadpole, and after swimming an inch or two, it rested on the sides of the glass, tail downwards. Its form at this time might be compared, when under the microscope, to a codfish with the head cut off behind the gills, and then two large eyes put on sufficient to cover the front and bulge out on each side. With a good inch-power we could see no internal organs, except the intestinal canal, and no circulation. They are now a week old, and about $\frac{1}{4}$ inch long; their head still seems to be all eyes, but their form and mode of swimming are now very much like that of the old fish. I have just put one under the microscope, and find it much more developed; the fins and tail are like a bit of tissue-paper, the stomach is very large, and each pump of the heart is plainly seen, whilst the circulation is now a sight worth seeing. I have exhibited them under the microscope at a meeting of the United Field Naturalists' Society and to several of my friends, and none of them have ever heard of their having bred in an aquarium before; and thinking that this would interest many of your readers must be my excuse for troubling you with these remarks.—*John Waddington, Bury.*

Discoloration of Cooked Meat.—A joint of lamb roasted on Monday was eaten of by three persons, without any peculiarity being noticed in it. After dinner on that day the joint was placed in a cool and rather damp larder, with a wire-gauze dish-cover over it. In this position it remained untouched till Wednesday (two days), and then, on removing the cover, the exposed parts, particularly the cut surfaces, were found to be thickly-studded over with spots and surfaces of a rich carmine colour. Bone, muscle, and fat were all more or less affected, but the fat and the upper surface were more affected than other parts. There was no smell or other sign of putrefaction at this time. It has been conjectured that an alga allied to, if not identical with, *Protococcus nivalis*, is the cause of this singular appearance in the meat. Can any fungologist inform me if this is likely to be the case?—*B.*

The Cuckoo's Eggs.—I never saw or heard of cuckoos' eggs that were not shades of the one colour; neither did I ever before hear that the old bird "turns out those previously in the nest." I have seen on many occasions one, and on two occasions two, young cuckoos in the nest with their foster-brethren; and as the strangers grow they shove out the rightful owners. Their bodies are specially made

for this purpose, being in the shape of a wedge, the thin edge of which they get under the bird they want to get rid of, and when it is fairly on its back they throw it overboard. Often have I found a young cuckoo by my eye being caught by a dead nestling at the bottom of a hedge or ditch. Cuckoos in general lay their eggs on the ground, and afterwards carry them in their bill to the nest they wish to place them in. I have often been brought to see a "cuckoo's nest," and always found that it was a sparrowhawk's nest, a hen sparrowhawk and a cuckoo being very similar. A young cuckoo is fed quite differently to the young of any other bird that I have seen. Its tongue being a flat movable table that it can shove in and out at pleasure, on this table the foster-parent places the food, and never in the young bird's mouth. Young cuckoos are very easily reared, and make good pets, but invariably die in the winter if kept in confinement.—*G. H. K.*

The Cuckoo's Eggs.—I formerly had good opportunities of observing the habits of the cuckoo, having been born in a country-place where there were a great many of those birds. I do not think the cuckoo can "voluntarily influence the character of her eggs." I am rather of opinion that she lays eggs of divers colours, and that when she has laid one, and after she has seen it, she carries it in her bill to the nest of some other bird whose eggs correspond most nearly in colour to her own, and therein deposits it. She may not always find an egg exactly like hers, so takes that which is nearest; and many birds are not at all particular as to what they sit upon. The cuckoo generally chooses a nest of large birds. I never knew an instance of a young cuckoo being found in a wren's nest.—*John Carrie, Bolton.*

The Colias Edusa.—The county of Dorset furnishes many a locality in which this charming insect is usually common; but in this respect there is so much difference in seasons that we cannot resist a trifle of gossip upon the subject. It will be remembered that last year (1875) the summer was remarkably wet and unsettled, it was then a matter of difficulty to meet with a specimen in a long journey. How different it has been with the present hot and dry season may be judged from the fact that on the very morning of our writing no less than eighteen specimens were captured in about an hour. While residing in Dorsetshire, we have observed that the frequency or unfrequency of the Colias is a matter of temperature, as we have observed that in wet and cold summers it has been difficult to procure specimens, while in our summers of drought they are always abundant.—*J. Buckman.*

Colias Edusa.—With reference to the remark of your correspondent, Ed. Lovett, that *Colias Edusa* does not hybernate, I wish to inform him that a specimen of this insect, much battered, was taken on a road near Winchester in the beginning of June this year.—*Frank Johns, Winton.*

Large Bream.—Though the bream your correspondent, "A. P.," describes was, without doubt, a fine fish, still I should not consider it out of the common, more especially had it been caught in a pond, instead of the Trent. There are many accounts on record of very fine bream having been caught. In one of our smaller works on angling, which, however, has gained a name for its accuracy and truthfulness, is mentioned the fact, that "In the north of Europe this fish [the Bream] has been known to reach the weight of twenty pounds; and in 1749 there were taken at a single draught, out of a large lake in Sweden, five thousand bream, the aggregate weight of which was 18,000 lb. We have ourselves caught them four or five pounds in weight, and have heard of other people catching them still larger; but this size is by no means general."—(*See* "Angling; or, How to Angle and Where to go," by Robert Blakey, p. 81.) The following I take from a book now, I suppose, seldom met with; namely, "The Art of Angling," by R. Brookes, M.D. My edition, which is the seventh, bears date 1790. Under the head of Bream the Doctor says:—"Gesner tells us he saw one that was a yard long and two feet broad; another was caught with angling in the Mersey, which weighed nine pounds." Though an angler myself, I have never had any sport with bream, nor do I think I should care to, as long as we have so many other freshwater fish that give really good sport. While angling at Nailsea Ponds, near Bristol, last Whit-Tuesday, I saw a man land a very nice bream, which weighed by my scale $2\frac{3}{4}$ lb., and was considered by all present to be a very nice fish. Few writers speak well of the Bream from a cook's point of view, though our good old father, Izaak Walton, in his first edition of "The Complete Angler," speaking of the Bream, says, "He is by Gesner taken to be more pleasant or sweet than wholesome."—(*See* the fac-simile reprint of the first edition of "The Complete Angler," p. 174, recently published by Elliot Stock, 62, Paternoster-row, E.C.—*Charles Williams, Redland.*

Black-and-white Crows (?)—Early this month, as I was walking through the park of one of our neighbours, I was surprised to see what I at first thought was a speckled Hamburg hen pecking about on the grass amongst a number of crows. Approaching nearer, I saw it was a black-and-white crow, most beautifully marked, in large spots of black and white, all over its body. On my getting close to it, it flew away. Anxious to see it again, I followed the crows for some distance across the park, and saw it once more on the grass amongst the flock I had disturbed. On returning home, and saying what I had seen, I could see it was thought I had made a mistake; but to my great delight, about a fortnight afterwards, as three of us were driving on the high road, with the park on our right, and some fields on the left hand, the coachman suddenly made an exclamation, and, pointing with his whip, we saw amongst a number of crows my black-and-white one. It flew just in front of the horse's head, from the fields into the park, so we had a good view of it. It is rather smaller than the black crow, but is an exceedingly handsome bird, the white spots contrasting so startlingly with the black. Would you kindly let me know, through the medium of Science-Gossip, whether or not black-and-white crows are of rare occurrence?—*F. M. C. Whittaker.*

Land Shells.—During a recent tour on the Continent in August and September, 1876, I found the following shells:—*Helix arbustorum* and *H. obvoluta*, at the falls of the Rhine; the latter also in the neighbourhood of Thusis. *H. lapicida*, in Gorge de Trient, Vernayaz; *H. rupestris* and *Pupa avenacea* together, in abundance on a sunny wall near Interlaken; *H. pomatia*, common; I found a fine specimen at Kohleren, near Thun; also another close to the celebrated falls of the Pissevache, Vernayaz.—*H. J. Taylor.*]

STRANGE BIRDS.—The finch described would seem to be the *Fringilla nitens*, which Bechstein describes as in size somewhat less than the common sparrow; plumage of the male blue or jet-black, beak and feet flesh-coloured, irides white. The hen differs in having the underside of the body yellowish-brown, the rump grey, and most of the black feathers edged with grey or yellow: the voice pleasing and soft. It is a native of Cayenne and the forests about Carthagena, is easily tamed, and should be fed on rape, millet, and poppy-seed, with a little ripe fruit occasionally. It is probable that the bird described is a hen or a young cock; the other being without doubt an old bird.—*Frank Copeman.*

THE SWALLOW-TAILED BUTTERFLY.—Your correspondent, J. S. Wesley, is mistaken if he supposes that this butterfly is not to be met with in Kent. Towards the end of last September I was shown as perfect a specimen of this insect as any collector could wish to possess. It had been caught in a clover-field opposite the brewery at Ash, near Sandwich. I should have inserted this notice before, only I expected that the captor would have done so.—*C. W. H., Eastry.*

ARAUCARIA.—I have a specimen of *A. excelsa*, about fifteen or sixteen feet high, the lower branches of which are gradually dying, although the upper portion is growing, and appears very vigorous. The species seem to be attacked by a kind of rust, which spreads in time over the whole branch, and ultimately causes its decay. In the next garden to mine is one in a similar condition; while, in a garden a few hundred yards off, there is a handsome specimen of *A. imbricata*, which has not lost a branch. Can any of your correspondents explain the cause of this disease, or suggest any remedy for it?—*Thomas Bird.*

WATERING WINDOW PLANTS WITH COLD TEA.—A lady friend of mine in the country, not far from here, informs me that she invariably uses *cold tea* for watering her window plants, and has done so now for a long time. Finer, more vigorous, or healthy plants it is impossible to see,—not such a thing as "green fly" to be seen about them; but previous to using the *cold tea*, she was troubled, like other people, with those pests. I may also mention that in potting her plants, she mixes *tea leaves* with the soil, not having ready access to *leaf-mould*. This may be a useful hint to others similarly situated.—*G. H. A.*

DENSITY OF SEA-WATER.—Your correspondent on the "Density of Sea-water" (p. 237) has omitted to notice that the temperature C., in "depth of the sea," is (—) minus. This explains his difficulty. And has probably been observed by many of your readers. —*Chas. Fred. White.*

FLOWER OF CARROT.—Last summer, as I was walking round my garden, I was struck to see the centre of the flower of the common carrot (*Daucus carota*) was of a bright red colour. I examined it very carefully, but could not detect any cause for this peculiar change of colour. The flower was quite perfect, but I could not tell whether each cell of the petals contained colouring matter, only having a dissecting microscope by me at the time. I shall be glad to know if this phenomenon is common?—*A. P.*

EREBIA CASSIOPE.—Has any entomological contributor ever met with this species in Delamere Forest, Cheshire, a locality given, I think, by Coleman? I have searched there more than once for it, but quite without avail. As it is a very local species, it is very probably confined to a few spots in the forest which I may have missed. Indeed, to me the place seems singularly devoid of butterflies of any kind. I should like to know whether any other entomologist has searched this locality, and if so with what result, especially as regards the Cassiope. —*W. E. S.*

THE "FLOWERS OF THE FOREST."—It may not be amiss, as there was a paper (evidently only intended to be a light one) on the New Forest, in a late number of SCIENCE-GOSSIP, to mention that between Christ Church and Lyndhurst used to grow, and I hope does now, that very rare plant *Spiranthes æstivalis*, of which Bentham says, "the only known British stations are a bog in the New Forest, in Hampshire, and in the Channel Islands." It flowers "late in summer," whereas the visit described was in May.—*J. S. Wesley.*

WOOLLEN MOTHS.—It is not a moth, but its larva, that mines in and injures fur and woollen materials. Many species do so. I recommend *from experience* that all clothes, &c., be well examined. Those that are untouched should be brushed and shaken, and put into drawers, boxes, &c., where moths cannot get to them. Then those that are injured should be well beaten, shaken, and carefully brushed on a flat surface, so that all larvæ and pupæ now existing may be got rid of, and then that these should be also put carefully away, but not with those that have been found free. All clothes that are not in wear or use should occasionally be looked over. Preventing access of the moths is the main thing: if they do not lay eggs no harm can come.—*J. S. Wesley.*

NATURAL HISTORY NOTES.—Mr. Collier James must I think have been a little excited at seeing the snake, and mistaken the two yellow broad streaks at the back of the head for the corolla of a primrose. When a snake has got its new skin, the yellow is very bright. I do not see how a smooth primrose could attach itself to the slippery snake's neck. Perhaps the snake had in its mouth some insect or living creature seized with a primrose's flower.— —*J. S. Wesley.*

VANESSA URTICÆ does not pair till spring: so then would be the time to make sure as to the sex. *J. S. Wesley.*

FERNS ON CHURCHES.—I have read with much interest the letter of "J. T. R." in your August number, respecting "Ferns on Churches." The only fear I have is that some thoughtless collectors may take advantage of his information to devastate the spots named, as I, unfortunately, have known to be the case in some instances in this neighbourhood. Notably the sufferers have been *A. ruta-muraria* and *Trichomanes*. I could add several habitats to those mentioned by "J. T. R.," if I felt that the information would be of service to science, and not be seized upon by mere *dilettanti* to destroy. Please use your well-known influence to prevent the wild natural plants of rarity being transferred into cultivated "collections."—*J. S.*

FERN COLLECTING ON NORFOLK CHURCHES.—I was much interested in reading the above interesting article in SCIENCE-GOSSIP for August by "J. T. R.," and now beg to draw further attention to this

part of Norfolk. "J. T. R." says, at "Wells we could find none." Does he mean the rue fern, or no ferns at all? If the latter, I beg to contradict this statement, as there are plenty of the common maidenhair spleenworts on the church; and, in proof of this, I have collected some this morning and sent to the editor, which, though small, are not the largest by any means. As "J. T. R." says "this part of the coast is not so attractive" as other parts of the county, I am quite sure it is only because it wants to be known more to be appreciated. The beach here is a rare storehouse for curious shells, and being beautiful white sand, it is the very place to spend many a happy day. The country being so healthy around here, bracing and health-giving breezes make it the very place for a refreshing quiet after London life. Inland are delightful walks, plenty of ferns and other wild plants; in fact, at Hindringham, seven miles from here, one might fancy himself in Devonshire. I inclose five other varieties gathered within seven miles of this place (Wells).—*J. W. Richford.*

Cause of Colouration. — In the differing opinions as to the cause of colour in birds, butterflies, &c., is sufficient reason assigned to heat? I understand that all flowers would be white if grown in a cellar and never admitted to the sun's influence. In all tropical countries we find the brilliant colouring in birds, butterflies, and flowers; and in the far north, white bears, &c. Might not the blacks have obtained that colouring originally from the excessive heat of Africa? Colour, like feature, figure, voice, being transmitted to offspring, when become indigenous.—*H. B.*

Harvest Bugs.—In the locality in which I reside we are much infested, more particularly in the months of July and August, with what are called "Harvest Bugs." Can you or any of your readers inform me how to prevent the intrusion of these unwelcome visitors? If not, what is the best antidote to allay irritation, as their sting or bite to some persons is almost unbearable.—*G. H. Piper.*

Disease in Pheasants.—Many young pheasants have died this season from a disease called by the gamekeepers the Gapes. The bird when ill gasps and gapes (hence the name), and ultimately dies of suffocation from the presence of a peculiar worm in its windpipe of a letter Y shape. Can any of your readers give me any information as to the history, &c., of this parasite? I have prepared five specimens of it, and shall be glad to describe it, or give a diagram, if necessary to its identification. It would seem to be a "twin," the male the smaller, and the female the "better half." What is known of this "gape-worm"?—*W. J. Dickson, M.D.*

The Cannibalistic Habits of the Common Newt.—In answer to E. Stop's question, in the September number of Science-Gossip, as to the cannibalism of newts, I can certainly say that I have observed this tendency in the specimens which I kept in my aquarium. I had some young newts and some old ones, but in a very short time the adults divested the younger ones of their tails and gills, and only one out of about a dozen lived long enough to reach the adult age, and then it had no tail. One very small one vanished entirely.—*G. W. C.*

The Adder.—In answer to "T. P. B.'s" query concerning the veracity of the account of a death from an adder's bite, I may state that an account of it appeared in the *British Medical Journal* of August 5, and I do not think that it would be published in that paper without some reservation as to the probability of the occurrence. Snake-bites are seldom fatal in this country, the adder not possessing a sufficiently energetic poison to destroy a healthy adult, though they might possibly kill a child, or a very delicate and weakly person. The venom is considerably increased in intensity during spring and summer, at which periods the reptile is in strong health and proportionally virulent. Assuming this case to be true, we must infer that the victim was in a state of health which rendered him more than ordinarily susceptible to the effects of virus introduced into the system, and that the adder was then best fitted for inflicting a serious injury. In such cases a well-authenticated account would set all doubt at rest, and an imperfect account should never be published. The next time a similar affair occurs, the scientific world ought to be furnished with every particular, such as the constitutional history of the victim, the circumstances under which the accident happened, and proof that the culprit is really the adder, and not another species of viperina which might be in the neighbourhood from an inexplicable cause. The question of "T. P. B." betokens a certain amount of caution, and a resolution not to be "gulled" when an affair is shrouded in mystery. This, like the "sea-serpent story," furnishes food for reflection.—*Frank Richardson.*

Camberwell Beauty.—On August 16th I was looking for Edusas in a lucern-field at the back of the church at Broadstairs, Kent, when I observed something flying at a little distance from me, and after a chase succeeded in catching a very fine specimen of the Camberwell Beauty.—*George Banke.*

Nest of Oyster-catcher.—When in Shetland in June last on a nesting expedition, I found on a small island a heap of limpet-shells amongst the grass, and on the heap was an egg of the Oyster-catcher (*H. ostralegus*) quite fresh. The birds not being able to find a suitable nesting locality in the island of pebbles or sand, had evidently accumulated the shells for nesting purposes. On another occasion I found the nest of the Lesser Black-backed Gull (*L. fuscus*) to consist of a piece of rope.—*C. D. Wolstenholme.*

"Silvan Sketches," mentioned by your correspondent in Science-Gossip for March, p. 70, is, I presume, "Remarks on Forest Scenery and other Woodland Views," by William Gilpin, in two volumes, dedicated by him to William Mitford, Esq., March 4th, 1791; the later edition edited by Sir Thomas Dick Lauder, Nov. 30, 1833. We ourselves bought this interesting work at an old book shop, and were fortunate in meeting with it in a first-rate state of preservation, containing the preface written by Gilpin himself, as well as the one written by Sir Thomas Dick Lauder, Bart.—*E. Edwards.*

Scarlet Thorn. — With reference to S. A. Brenan's remarks (Science-Gossip, page 234) respecting the Scarlet Thorn sometimes throwing out white and pink tufts of flowers, it may not be uninteresting to state that a handsome scarlet thorn which has now been planted 24 years in our garden, three years since bore high above the graft a tuft of pure white blossoms, which struck me to be so remarkable that I dried the spray. The last two

successive springs, upon the same branch almost, tufts of white, pink, and deep scarlet flowers have appeared. This singular appearance of the white tuft of flowers upon the Scarlet Thorn I found a short time ago had been clearly explained by Mr. Charles Darwin, in the 1st volume of his work, "The Variations of Animals and Plants under Domestication," page 377, where he states: "*Cratægus oxyacantha*, a dark scarlet hawthorn, has been known to throw out a single tuft of pure white blossoms; and Mr. A. Clapham, nursery-man of Bradford, informs me that his father had a deep crimson thorn grafted on a white thorn, which during several years always bore high above the graft bunches of white, pink, and deep crimson flowers." The appearance of the white flower is the tendency shown in the tree to revert back to the colour of the parent stock,—the white thorn upon which it was grafted, as is the case with Adam's Laburnum, or *Cytisus Adami*, which so frequenty produces racemes of yellow and purple flowers alternately upon the same branch.—*Elizabeth Edwards.*

Teucrium chamædrys (*Wall Germander*).—I should be much obliged if any of the readers of Science-Gossip would inform me if this plant was supposed formerly to possess any medicinal value, as this would throw a light upon its being found growing wild, only in this part of Shropshire, on an almost inaccessible ruin of Wenlock Abbey, also on a rock close to a hermit's cave, at a distance of some miles from the Abbey. It has been found growing on the ruins of Palmyra. The question that suggests itself to me is this—can hermits and crusaders have brought over the plant from the Desert and the Holy Land for the sake of its medicinal virtues? I believe it is rarely found, and is described as a wild flower which has become naturalised. It would be interesting if others would describe the site on which they have found it growing.—*S. E.*

Gold-fish in Confinement.—These fish are undeniably ticklish to manage; and I should attribute the injuries Mr. Hambrugh's specimens exhibit to malicious "nips" given by one to the other. Some authorities tell us that when gold-fish (or other species) attack each other in the aquarium, it is because the food is insufficient or unsuitable. I have seen gold-fish, during the winter months elaborately fed with bread crumbs, every particle not eaten being removed, if possible, lest the water should be soured; but I cannot think such a plan is requisite. In the time of my great-grandfather, as I know from a family tradition, those who kept gold-fish changed the water of the globe daily, unless the weather was cold. This must have been far from conducive to the longevity of the fish.—*J. R. S. C.*

Tennyson, and his "Sea-blue Bird of March."—It is amusing to read the various speculations which have been indulged in as to the species the poet meant to indicate by an epithet familiar to the students of "In Memoriam." At least four birds have been contended for, and I will put them alphabetically, as their order in matter of probability is open to debate; namely, the Fieldfare, the Kingfisher, the Tomtit, and the Wheatear. But if this had been penned by Wordsworth, and not by his successor in the Laureateship, he would have saved us all trouble in the way of speculation, by adding to the allusion the familiar name of the bird meant. I think, however, that the debaters have overlooked one important point: much depends upon whether Tennyson speaks of an arriving or of a departing species, since March brings summer visitants, though it also dismisses our winter residents. Is it not likely he had in his eye the rapid flight of some bird preparing to leave England? And it should be noted that in some editions of "In Memoriam" the phrase stood, "the blue sea-bird of March."—*J. R. S. C.*

Local Names of Birds.—Your correspondent, "Dipton Burn," in Science-Gossip, p. 191, mentions that the Yellow Hammer is, in Northumberland, called the Yellow Yorlin. This, I think, is a mistake; as, although I have been a resident all my life in this county, I have never heard it called by that name. It is generally designated the Yellow Yowley, but I have heard it called Yellow Yorlin in the south of Scotland.—*J. G. Henderson, Newcastle-on-Tyne.*

Volvox Globator.—I see in Science-Gossip for August, among Notes and Queries, a question, "Is it usual to find the *Volvox globator* only during about a fortnight in June, and for it then quite to disappear?" I met with it last year in great abundance in ponds at Esher early in April, and again in the same ponds late in August. This year, being at Surbiton about the middle of June, I revisited these ponds, but did not meet with a single specimen. Any person going from Surbiton to Esher and stopping there, ought to find them at the proper season, if he passes under an archway just before reaching the station, and follows a road for about 200 yards, where the common ends. Near this point, on the right-hand side of the road (which, when I last visited it, was covered with a beautiful *Hottonia palustris*, then in full blossom), I think, if he goes at the right time, your correspondent will not be disappointed.—*Robert Battersby.*

Stag-beetle.—A short time since, on the removal of a decayed oak-post in my garden, the post was found to be perforated in its whole length with numerous openings produced by the larvæ of the *Lucanus cervus* or Stag-beetle. Eight or nine full-grown larvæ in an active state were found, with a female Stag-beetle in a torpid state. With a view to preserve them, I put them in a large garden pot, with some of the rotten wood and mould, as I thought that some of the readers of Science-Gossip might like to have a few specimens. The *Lucanus*, though plentiful at times in Kent, is not often seen in the northern counties of England. If reference is made to the back volumes of Science-Gossip, May, 1868, page 108, a beautiful engraving of the *Lucanus* in all stages will be found taken from a work by Professor Blanchard. It is stated that the larvæ vary in size when full-grown, depending upon the kind of wood they feed on.—*J. B. Spencer, Blackheath.*

Pronunciation of Names.—Will you kindly tell me how those generic names which are derived from the names of foreigners should be pronounced? Should they be pronounced as if they were simply Latin words, or should the foreign pronunciation be retained? For example:—*Gleichenia*, is this to be Glykenia or Glyshennia? *Selliguea*, is this to be Selliguéa or Sellega? *Lachenalia*, should this be Lakenaglia or Lah-shen-ah-lia?—*E.C.*

Colour of Birds, No. 143, p. 259.—In reply to your correspondent "A. P.," who desires to know what British birds have been discovered white, and who enumerates several which have come under his

own observation, when I was in the New Forest some year or two since I saw in the possession of one of the keepers a remarkably handsome variety of the great spotted woodpecker (*Picus major*). It was pure milk white, with a scarlet head.—*Joseph Anderson, jun., Chichester.*

Habits of Herons.—I should be glad if any informant can kindly answer the following queries:—1. Heronries are in oak or fir woods. Can an exception be instanced? 2. Herons and rooks, it is stated, seldom build in company. Is this the case in the northern part of England? 3. Are not heronries sometimes situated at a considerable distance from water? Any notes as to the habits of this fine bird will be of much interest.—*F. H. Arnold, LL.B., Fishbourne.*

Damar as a Mounting Medium.—I have read your correspondent's (Mr. Charles Williams) excellent article under the above heading in last month's Science-Gossip, and quite agree with him as to the superiority of damar, especially that in tubes, over Canada balsam. I have never found any difficulty in getting rid of air-bubbles; but there is one drawback to its use, viz., that it requires a tough varnish to prevent the cover from slipping. I have tried the shellac varnish mentioned, but find it very liable to crack. I have known slides which have had two or three coats of shellac, and also a coat of ornamental varnish over that, crack and let the coloured varnish run in, and of course spoil the object. I should be very much obliged if any of your correspondents would recommend a varnish suitable for damar which will neither run in nor crack. Speaking of ornamental or finishing varnishes, I have tried those mentioned in Science-Gossip for April, 1876, page 77, under the heading "White and Coloured Varnish for Ringing Slides," and found them answer perfectly. They are easily prepared, and very neat and pretty. I should advise any one who has not seen them to give them a trial.—*J. A. Le M. H.*

The Singular Stones near Tichborne.—These peculiar stones, mentioned by your correspondent Helen E. Watney, are very easily explained. The late Colonel George Greenwood, who resided lately at Brookwood, at the entrance to which estate these stones stand, was very fond of amusing himself with improving the appearance of roads in the neighbourhood. In one way he did this by planting copper-beech-trees all along the hedges bounding the piece of land called the Dene, a common, and having at some time found some large boulder-stones at a small village called Froxfield, the idea struck him that they would look fanciful if placed on the Dene. One large stone was consequently blasted with powder, and the pieces, together with several smaller stones, were drawn down to their present position by an old carter, about twenty years ago, and this old man is still alive. The pieces were brought down on a timber-waggon, and hoisted with the timber crane under Colonel George Greenwood's instructions; and it was his idea that it would imitate Stonehenge on a *small* scale. This is the true history of these stones, well known to any resident in this neighbourhood, and they have no connection whatever with any Druidical temple.—*West Meon.*

Jelly containing Diatoms, &c.—I have discovered a place rich in a jelly containing Diatoms, Desmids, &c.; also an earthy matter adhering to a perpendicular rock (it had the appearance of mortar splashed upon the wall in the operation of rough-cast), it also contains Diatoms, Desmids, &c. There grew a jelly-like substance resembling leaves here and there among it.—*J. J. M.*

Microscopical.—Will some of the readers of Science-Gossip kindly inform me how to treat spiders so as to preserve them for a collection, and also how to mount them for microscopical study. I mean what media to use, &c.—*F. E. Fletcher.*

Sparrowhawk and Crow.—What does "A. P." mean, in Science-Gossip for October, under the head of "Sparrowhawk and Crow," when he says: "I found the cause of the commotion to be a *large* sparrowhawk clinging to the spire"? Does "A. P." mean to say that sparrowhawks can lessen their size according as they wish to suit their purpose? This would seem evident from what he says a little farther on: "A few days after, the same hawk again visited the church in the middle of the day, but as the pigeons were not in the field feeding, it sailed round three or four times and then departed. The only thing noticeable about the sparrowhawk was its *small* size." That is, the sparrowhawk was a large one a few days since, but to-day it is of "small size."—*J. W. D.*

EXCHANGES (*continued*).

Hooker's "Species Filicum," parts 10, 15, and 16, are offered for parts 11 and 12.—Mr. Cox, 92, Denmark-street, Camberwell, S. E.

Wanted.—Fifteenth Report of East Kent Nat Hist. Soc. 1873. Good exchange given. H. E. Freeman, 48, Woodstock-road, Finsbury-park, N.

I have reserved a section of Fossil Vegetable Tissue for a correspondent in Boston, U.S. America (whose address I have lost), for his section of Dog-rose (double stained).—John Butterworth.

Wanted.—Tracings of the figures and descriptions of Palæozoic Polyzoa, from King's Catalogue (Goldfuss's); 120 "Quart. Jour. of Geo. Soc." (J. Young's); Phillips's "Petrifactions of Derbyshire"; "Annals and Mag. of Nat. History," vol. xv. Slides of Micro-Geology will be given in exchange.—G. R. Vine, Attercliffe, Sheffield.

BOOKS, &c., RECEIVED.

"The Geology of England and Wales." By H. B. Woodward. London: Longmans & Co.

"Geological Map of Scotland." By Prof. Geikie. London and Edinburgh: W. & A. K. Johnston.

"Monthly Microscopical Journal." November.

"The Naturalist." November.

"American Naturalist." October.

"Land and Water." November.

"Les Mondes." November.

"Monthly Journal of Education." November.

"The Argonaut." November.

"Botanische Zeitung." October.

"Ben Brierley's Journal." November.

Transactions of "Manchester Geological Society;" "Eastbourne Natural History Society;" "Watford Natural History Society;" "Quekett Club;"

Communications Received up to 7th ult. from:—J. C.—R. B.—J. F. R.—C. W.—G. B.—A. S.—F. J.—J. W. D.—C. D. W.—F. K.—C. F. W.—G. G.—W. E. S.—W. G. P.—J. R. S. C.—W. M.—S. E.—J. K.—C. E. E.—G. S.—E. E.—G. C. D.—J. G. H.—J. S. W.—R. P. C.—R. B.—W. M. R.—E. E. E.—C. W. C.—J. W. R.—T. E. W.—R. R. T.—G. W. C. G. H. P.—A. B.—E. B. T.—Prof. B.—J. W.—Dr. H. W. L.—G. H. K.—S. A. S.—G. H. A.—J. M.—H. L.—S. C. S.—D. B.—C. P. O.—G. G.—E. C. M.—S. A. S.—A. S.—S. A. B.—J. B D.—W. J.—Dr. F.—W. H. S.—Dr. E. J. T.—G. H. A.—E. S A.—L. J. M.—J. S. H.—W. L. S.—E. B.—C. W.—J.W. M.—B. M. O.—T. B. W.—H. I. T.—J. S. W.—J.W. B.—Sir P. G. E.—H. A. F.—F. C. H. D.—W. E. S.—F. M. C. W.—G. W. L.—W. H. G.—A. H.—C.W. H.—Dr. E. B. A.—M. F.—C. P. H.—T. B—T.W.—D. A.—J. J. M.—F. F.—J. A L. H.—W. S.—J. B. S.—J B.—H. B.—E. E.—J. G.—W. F.—W. R. H.—A. J. A.—H. C. C.—J. A. jun.—E. C.—J. H. L.—R. G.—W. B.—A. M. C.—C. D. W.—H. E. F.—H. A. F.—F. L. C. R.—G. R. V.—T. D.—C. F. S.—G. S.—F. H. A.—&c., &c.

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

Q. R. (Elie, Fife).—Both specimens, in excellent condition, are: No. 1, a large flowered form of *Diplotaxis muralis;* No. 2, the common, or plant generally met with in Britain, of *Diplotaxis muralis.*

W. D. (Carlisle).—The heath you enclosed was the Petty Whin, or Needle Gorse, of the midland counties; still we are not surprised it puzzled you, for we never saw it so entirely destitute of the long prickly spines. It is botanically named *Genista anglica*, Linn.

W. K. (Leeds).—Many thanks for the accurate sketch of the Kentish water-weed; it is the Hawthorn-scented Pond-weed (*Aponogeton distachyon*). We never saw it anywhere so plentifully, and looking so beautiful, as in the large ornamental pond of the Edinburgh Botanical Gardens.

Mrs. H. (Chirk).—It is difficult to name any species from merely popular descriptions. However, we have no doubt that your little plant, with globular heads, is the pretty Apple-moss (*Bartramia pomiformis*).

R. B. (Glasgow).—The fern from Campsie is a very curious form of the Male Fern (*Lastrea filix-mas*). Did you secure the root? If so, and you could oblige us with a few fronds or dried leaves, we shall be much obliged.

A. F.—No. 1 is the Ling, or Grig, of Northern botanists (*Calluna vulgaris*). No. 2 contains both the Scotch Heather (*Erica cinerea*, Linn.) and cross-leaved Heather (*E. tetralix*, Linn.). The latter may at once be known by the ciliated leaves and flowers in a small (tuft) umbel at the end of the stalk. No. 3 is also the cross-leaved Heather.

H. Q. L. (Wallingford).—We are sorry your specimens were so shrivelled and broken that it is difficult to again match the fragments: when again sending, be kind enough to press them for a few hours in some old book. No. 1. Skullcap (*Scutellaria galericulata*, L.). No. 2. The Eyebright (*Euphrasia officinalis*, L.). No. 3. Centaury (*Erythræa Centaurium*, L), a species more frequently used by herbalists than any known. No. 4. Spoiled. No. 5. *Polygonum Persicaria*, L.). No. 6. Quite separate from the number sent, so we did not know to which to refer it.

C. W. (York).—Your extract from a magazine, giving an account of a bird protecting its young against a venomous snake by plucking off and placing the twigs of a poisonous shrub across the nest, reminds us of the oft-repeated story of the Spider and the Toad, which forms the subject of one of Cowper's poems. The *dramatis personæ* only of the animals are altered. There cannot be a doubt of its apocryphal nature.

M. Warren.—1. *Bryum pallens.* 2, 4, 9. *Bryum pseudotriquetrum.* 3. *Cerutodon purpureus.* 5. *Hypnum cupressiforme*, with *Jungermannia albicans.* 6. Uncertain. 7. *Bryum cernuum.* 8. *Hypnum fluitans.*

Miss F.—The foreign mosses sent us to be named will require some time to examine.

H. M. C. A. (Lewes).—Your plant is not a British species, as you correctly surmise, but proves to be *Vincetoxicum officinale.*

Gregory.—Apply to Mr. King, Sea-horse House, Portland-road, who will give you all the information you want as to aquaria.

C. E. E.—Your description of the contents of the hen's egg seems as if it contained the embryonic chick. It can be nothing else.

J. S.—Get Lubbock's "Metamorphoses of Insects," price 3s. 6d. (Macmillan). This will give you a good idea of the general relative structures of insects.

J. Laing.—From the sketch of the stone, we have no doubt it is a natural internal cast of a fossil sea-urchin, perhaps *Ananchytes.* The small holes are the perforations for the ambulacral feet.

T. McGann.—The "Star-fish, which has no arms," you refer to, is either *Goniaster equestris*, or *Goniaster Templetonii;* most likely the latter, as the former is very rare. The spicules sent to us are probably those of *Uraster glacialis.*

W. Marshall.—Notes on the "Harvest Bug" occur in several of the back volumes of Science-Gossip, notably in that for 1873. You will find it figured and described in Carpenter's work on the Microscope.

W. H. S.—Your insect is evidently one of the Homoptera, or Bug family, and is called *Pentatoma dissimilis.*

L. J. M.—Your supposed "Glow-worm" has deceived many a one. It is not uncommon, and is a species of Centipede, called *Geophilus electricus.* Of course, it has no relationship whatever to the Glow-worm, which is a beetle.

S. A. S.—The "plant from Texas" is a locally common species of *Cornicularia*, a genus of "horse-hair" lichens abundant in the southern states of North America.

Mrs. D.—The malformed rose you sent us was altered by the divisions of the calyx (sepals) being converted into leaves. Dr. Masters, in his "Vegetable Teratology," calls this kind of malformation "phyllody of the sepals."

M. Needler.—Your "Aquatic Ichneumon" is doubtless *Polynema natans*, a hymenopterous insect of aquatic habits, which swims by means of its wings. You will find a full description of it in the Linnean Society's Transactions for 1863. We should much like to see one of your mounted specimens.

W. Jacobs.—Your marine specimens are: No. 1. A piece of sea-weed incrusted with Bryozoa (*Membranipora pilosa*). 2. A limy sea-weed (*Corallina officinalis*). 3. A calcareous polyzoan (*Tubulipora*). And 4. A red sea-weed (*Plocamium coccineum*). See figs. and descriptions in "Half-hours at the Sea-side."

F. W. S.—Your Australian sea-weed is *Ballia pulcherrima.*

"Chemicus."—Your sea-weeds are: No. 1. *Odonthalia dentata.* 2. Faded form of *Delessaria alata*, narrow var. 3. *Ptilosa plumosa.* 4. *Fucus serratus.* 5. *Rhodymenia palmata.* 6. *Delesseria alata*, var. *angustissima.* And 7. *Ptilosa plumosa.*

H. C. C.—The excrescences on backs of oak-leaves are called "Oak-spangles." They are caused by the leaves having been punctured by a species of *Cynips*, and are, therefore, not fungi.

Dr. Foote.—Prof. Williamson's work is published by the Royal Society in their "Philosophical Transactions," in parts or memoirs. Apply to secretary of Royal Society.

EXCHANGES.

The first six volumes of Science-Gossip bound in two, in exchange for really good Entomological Microscopical Slides. Must be first-class.

A gentleman resident in the Hawaian Islands would be happy to exchange specimens of the Volcanic Rocks of the islands with any one who would supply him with those of Great Britain.—J. B. D, Shelton, Hanley, Staffordshire.

Wanted.—A few specimens of *Synapta* and *Chirodota violacea*, in exchange for well-mounted Objects, &c.—W. L. S., 6, Dagnall Park-terrace, Sethurst, S.E.

"Collector's Hand-book of Algæ, Diatoms," &c., new, price 2s. 6d., exchanged for one on Lichens or Mosses.—B. M. O., 21, Newington Green, London, N.

Offered.—Nos. 60*b*, 468*e*, 468*u*, and *Lepturus incurvatus*, for 9, 43, 44, 49, 62, 89, 90, 255, 267, 348, 349, 358, 360, 367, 368, 372, 377, 418, 457, 468*i*, 484, 492, 538, 556, 665, 698, 810, 934, and 939, "Lond. Cat.," 7th ed.—John W. Burton, 35, Hemans-street, Liverpool.

Living Desmid, Diatoms, and *Voloox globator*, wanted, in exchange for Micro Slides.—J. Bewlay, Vine-street, York.

Wanted.—Coal-measure Fossils, unmounted, for Mounted Sections of Echinus spine. Wanted also large E. spines for sectionizing.—M. Fowler, 20, Burn-row, Slamannan, N.B.

Head of Japanese Silkworm (*Bombyx Yama-mai*).—Send a stamped directed envelope to W. H. Gomm, Somerton, Somerset.

Hair of *Ornithorthrynchus*, Vampire Bat, Polar Bear, Camel, and others, unmounted, for other good Objects.—E. J.W., 14, Albion-road, Dalston, E.

Skin of Dog-fish, neatly mounted, making a beautiful 2 in. object. For exchange send slide to C. P. Ogilvie, 28, Fitzroy-square, London.

Wanted.—All kinds of Foreign Birds' Skins, Eggs, and Nests. Give in exchange British Skins, or send list of many useful things to exchange.—Lebè, 230, West-street, Sheffield.

Micro.—Offers requested for one scruple weight of prepared Foraminifera. Wanted, Foraminiferous Sand.—J. Green, the Cross, March.

Mounted Slides of Foraminifera, from Ilfracombe, Devon, to exchange for Slides or Material.—H. A. Francis, Keswick House, 48, White Ladies'-road, Clifton, Bristol.

Agluiu, Quercus, Corydon, Adonis, Alveolus, Castrensis, Salicis, Ligniperda, Citraria, &c.; Pupæ of *Occellatus, Populi, Tiliæ, Ligustri, Menthastri, Vinula*, &c. Desiderata: Lepidoptera and Birds' Eggs.—R. Green, Rainham, Kent.

Side-blown Eggs of Curlew, C. Sandpiper, T. Owl, R. Plover, Golden ditto, Dunlin, Dipper, O. Catcher, R. Grouse, Landrail, A. Tern, Redshank, Black Guillemot, &c., in exchange for other good Eggs. Unaccepted offers not answered.—J. D., 9, Lancaster-street, Carlisle.

"Lond. Cat.," 7th ed.—Nos. 16, 18, 62, 79, 82, 99, 117, 167, 177*b*, 223, 234, 242*b*, 315, 417, 422, 427*b*, 442, 468*m*, *u*, 493, 498, 534, 576, 687*c*, 757*b*, 841*b*, 1,036, 1,090, 1,142, 1,180, 1,242, 1,540*b*, 1,558 (*subcærulea*), 1,565, 1,589, 1,590, 1,629*c*, 1,654, &c.—Send lists to J. Harbord Lewis, 180, Mill-st., Liverpool, S.

Have a quantity of jelly, also an earthy matter rich in Diatoms, Desmids, &c. Will be glad of offers of Mounted Slides, named, in exchange.—J. J. Morgan, Tredegar.

Wings of *Urania fulgens* and portions of *Urania Sloanus* for Microscopic Slides. *Edusa, Ægon, Quercus, Bidentata, Nupta, Psi, Brunnea, Loti, Spadicea, Oxyacanthæ*, and *Porphyræa*, for other Macro-lepidoptera, or dried British plants.—Joseph Anderson, jun., Alre Villa, Chichester.

INDEX TO VOL. XII.

WYMAN AND SONS, PRINTERS, GREAT QUEEN STREET, LONDON, W.C.

A CLASSIFIED INDEX

TO

HARDWICKE'S

Science-Gossip:

VOLUMES I. TO XII.

1865—1876.

LONDON:
HARDWICKE & BOGUE, 192, PICCADILLY.
1877.

PREFACE.

FOR several years past we have been frequently importuned to publish a General Index to SCIENCE-GOSSIP. On issuing a new series with the present year, marked by new type and improved paper, it was thought this would be a favourable opportunity for arranging a General Classified Index of all the Subjects treated upon in the Twelve Volumes which our Magazine has lived through.

The task, however, proved more formidable than we imagined; hence the delay in the issue of the Index. None of our readers will be more surprised than we have been, whilst seeing this laborious work through the press, at the enormous ground which has been covered in twelve years. If any proof were required as to the active spirit of inquiry and research which has been abroad during the above period, it would be no absurd boast to point to this Index as one token of it. Everything relating to Natural Science has been discussed and examined in our Volumes, so that the headings alone are sufficient to fill no small number of ordinary pages.

We are more convinced than ever that the spirit in which we have

endeavoured to conduct SCIENCE-GOSSIP is the right one—free as possible from the extreme technicalities of Science on the one hand, and from mere dilettantism on the other. Scientific men see with pleasure how largely increasing is the class of educated people who take an interest in their labours, and even devote as much of their own time to the same subjects as business or professional pursuits will allow; scientific information is more eagerly sought after by the more intelligent masses, and it is to these especially that we endeavour to appeal.

At the same time, we hope the present Classified Index will show that our labours have not been in vain in the cause of true Science. The Naturalist will see in it an Encyclopædia of general Natural History, full of details on most subjects, all of which can now be easily sought out. The paragraphs and articles may be very unequal in their scientific value, but we think that, as a whole, the Index shows that the Twelve Volumes of SCIENCE-GOSSIP include a mass of data which cannot fail to be useful for general popular scientific reference.

CLASSIFIED INDEX TO SCIENCE-GOSSIP.

VOLUMES I. TO XII.

1865–1876.

ZOOLOGY.

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

ZOOLOGY (*continued*).

BOTANY.

BOTANY (*continued*).

BOTANY (*continued*).

BOTANY (*continued*).

BOTANY (*continued*).

BOTANY (*continued*).

BOTANY (*continued*).

MICROSCOPY.

MICROSCOPY (*continued*).

MICROSCOPY (*continued*).

MICROSCOPY (*continued*).

GEOLOGY.

MISCELLANEOUS.

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